

# BZA Packet

November 21, 2022

**Hello All,**

Enclosed please find your packet for the meeting of November 21, 2022.

**We have:**

- 1 extension request
- 1 carryover
- 1 new case

If you receive any citizen inquiries regarding these cases the proposed plans may be viewed by going to:

[www.mtnbrook.org](http://www.mtnbrook.org)

- Calendar (upper right corner)
- Board of Zoning Adjustment (November 21, 2022)
- Meeting Information (for agenda) and Supporting Documents (to view proposed plans and/or survey select link associated with the case number)

If you have any questions about the cases please don't hesitate to give me a call at 802-3811 or send me an email at [slatent@mtntbrook.org](mailto:slatent@mtntbrook.org) ...

**Looking forward to seeing you on Monday!**

**Tyler**

**MEETING AGENDA**  
**CITY OF MOUNTAIN BROOK**  
BOARD OF ZONING ADJUSTMENT  
November 21, 2022  
PRE-MEETING: 4:40 P.M.  
REGULAR MEETING: 5:00 P.M.

**MEETING TO BE HELD IN PERSON AT CITY HALL AND VIRTUALLY USING ZOOM VIDEO  
CONFERENCING  
(ACCESS INSTRUCTIONS ON MEETING WEBPAGE)**

NOTICE

*Any variance which is granted today expires and becomes null and void one year from today unless construction is begun in less than one year from today on the project for which the variance is granted. If construction will not be started within one year from today, the applicant may come back in 11 months and ask for a six-month extension, which the Board normally grants.*

*Any variance which is granted, regardless of the generality of the language of the motion granting the variance, must be construed in connection with, and limited by, the request of the applicant, including all diagrams, plats, pictures and surveys submitted to this Board before and during the public hearing on the variance application.*

---

1. Approval of Minutes: October 17, 2022
2. **Case A-22-02: David and Corley Tickle** property owners, request a variance from the terms of the Zoning Regulations to allow an addition to the dwelling to be 34 feet from the front property line (Pine Haven Drive) in lieu of the required 35 feet. - **2938 Pine Haven Drive (Extension request; original approval on January 18, 2022.)**
3. **Case A-22-29: Andrew and Tiffany Linn**, property owners, request variances from the terms of the Zoning Regulations to allow a retaining wall to be up to 10 feet in height in the front yard (Michael Lane) in lieu of the maximum allowed wall height of 4 feet. **401 Michael Lane (Carry-over from the October 17, 2022 meeting.)**
4. **Case A-22-30: William and Judy Nelson**, property owners, requests a variance from the terms of the Zoning Regulations to allow request a variance from the terms of the Zoning Regulations to allow a detached accessory structure (pavilion) in the secondary front yard (Overton Road) in lieu of the requirement that accessory structures be located only in a side yard or rear yard. – **2704 Woodridge Road**
5. Next Meeting: **December 19, 2022**
6. Adjournment



## Variance Application - Part I

### Project Data

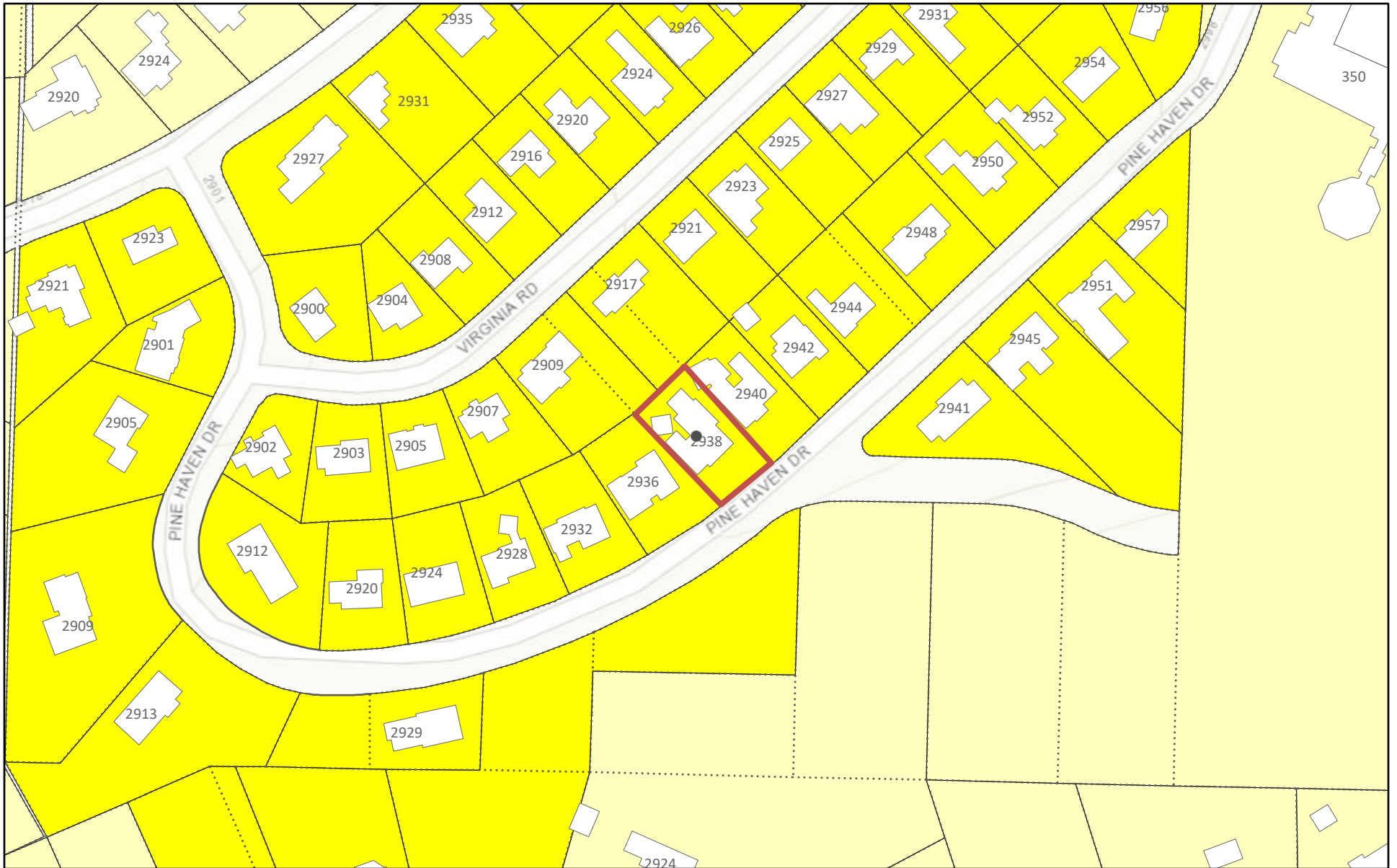
Address of Subject Property 2938 PINE HAVEN DRIVE  
 Zoning Classification RES "B"  
 Name of Property Owner(s) MR. & MRS. DAVID TICKLE  
 Phone Number 205-903-0010 Email corley.tickle@gmail.com  
 Name of Surveyor STEVE GILBERT  
 Phone Number 205-613-0375 Email shgilbert@bellsouth.net  
 Name of Architect (if applicable) CAREY HOLLINGSWORTH  
 Phone Number 205-907-3711 Email ch3archeatt.net

Property owner or representative agent must be present at hearing

Please fill in only applicable project information (relating directly to the variance request(s)):

|  | Zoning Code Requirement | Existing Development | Proposed Development |
|--|-------------------------|----------------------|----------------------|
| Lot Area (sf)  |                         |                      |                      |
| Lot Width (ft)   |                         |                      |                      |
| Front Setback (ft) <i>primary</i>  | <u>35.0'</u>            |                      | <u>34.0'</u>         |
| Front Setback (ft) <i>secondary</i>  |                         |                      |                      |
| Right Side Setback   |                         |                      |                      |
| Left Side Setback  |                         |                      |                      |
| Right Side Setback (ft):<br>For non-conforming narrow lots in Res-B or Res-C:<br>Less than 22' high →<br>22' high or greater → |                         |                      |                      |
| Left Side Setback (ft):<br>For non-conforming narrow lots in Res-B or Res-C:<br>Less than 22' high →<br>22' high or greater →  |                         |                      |                      |
| Rear Setback (ft)  |                         |                      |                      |
| Lot Coverage (%)   |                         |                      |                      |
| Building Height (ft)   |                         |                      |                      |
| Other  |                         |                      |                      |
| Other  |                         |                      |                      |

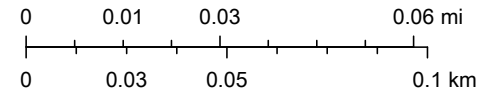
# A-22-02 Zoning



12/29/2021, 1:45:46 PM

- ..... LotLines
- ..... Tax\_Parcels 2021
- Residence B District
- Residence A District

1:2,257



JeffCoAL, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, USDA




# A-22-02 Aerial



12/29/2021, 1:46:41 PM

2018 Aerial

 Red: Band\_1

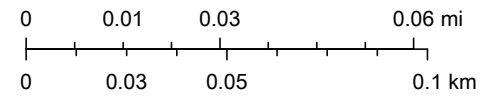


Green: Band\_2



Blue: Band\_3

1:2,257

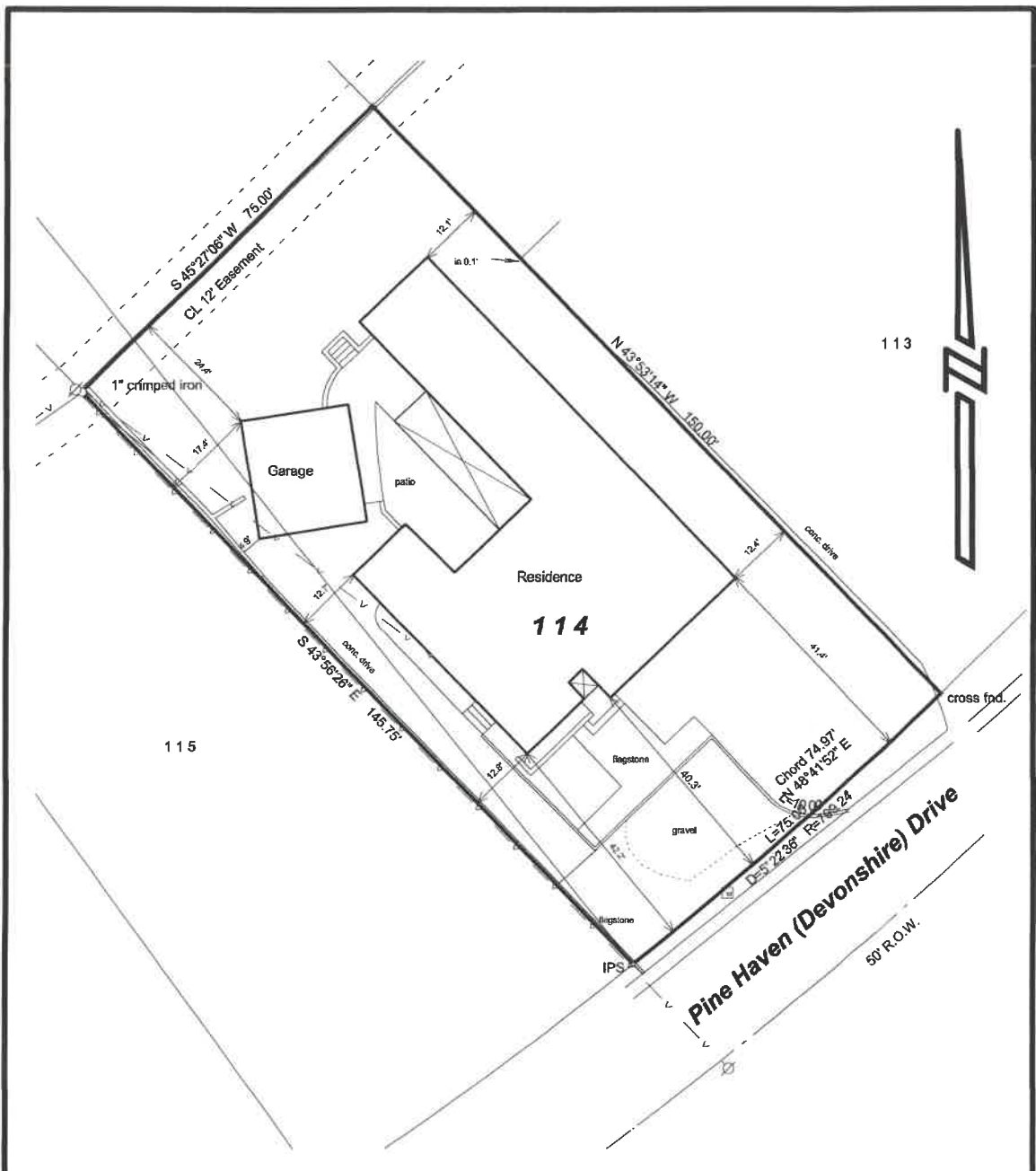


Jefferson County Information Technology Services, JeffCoAL, Esri, HERE,

ArcGIS Web AppBuilder

JeffCoAL, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, USDA | Jefferson County Information Technology Services | Hunter Simmons |





**EXISTING CONDITIONS**

STATE OF ALABAMA  
JEFFERSON COUNTY

I, Steven H. Gilbert, a Professional Land Surveyor in the State of Alabama, hereby certify to the parties listed below that the following is a true and correct copy of a map or plat of a survey made by me of the following described property:

Lot 112, Pine Crest, as recorded in Map Book 18, Page 64, in the Probate Office of Jefferson County, Alabama.

I further certify that the building(s) now erected on said property are within the boundaries of same except as may be shown; that there are no encroachments from adjacent property except as shown; that there are no Rights-of-way, Easements, or joint driveways over or across said land visible on the surface, except as shown; that there are no utility poles, guy wires, lines, structures, or supports therefor (excepting those that serve the premises only), except as shown; that I have consulted the Federal Insurance Administration Flood Hazard Boundary maps and found this property IS NOT located in a Flood Hazard Area (as determined by graphic plotting); and that all parts of this survey and drawing have been completed in accordance with the current requirements of the Standards of Practice for Surveying in the State of Alabama to the best of my knowledge, information, and belief.

FIRM Map No. 01073 C 0557 H September 3, 2010

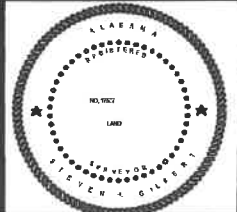
This survey was performed with conventional equipment and techniques. Horizontal and vertical control was established by GPS observations using NAVD 1988 vertical and NAD 83 horizontal datum. Bearings are based on Alabama State Plane Coordinates, West Zone. Corrections were obtained from the ALDOT CORS network.

This survey is invalid unless sealed in red ink.

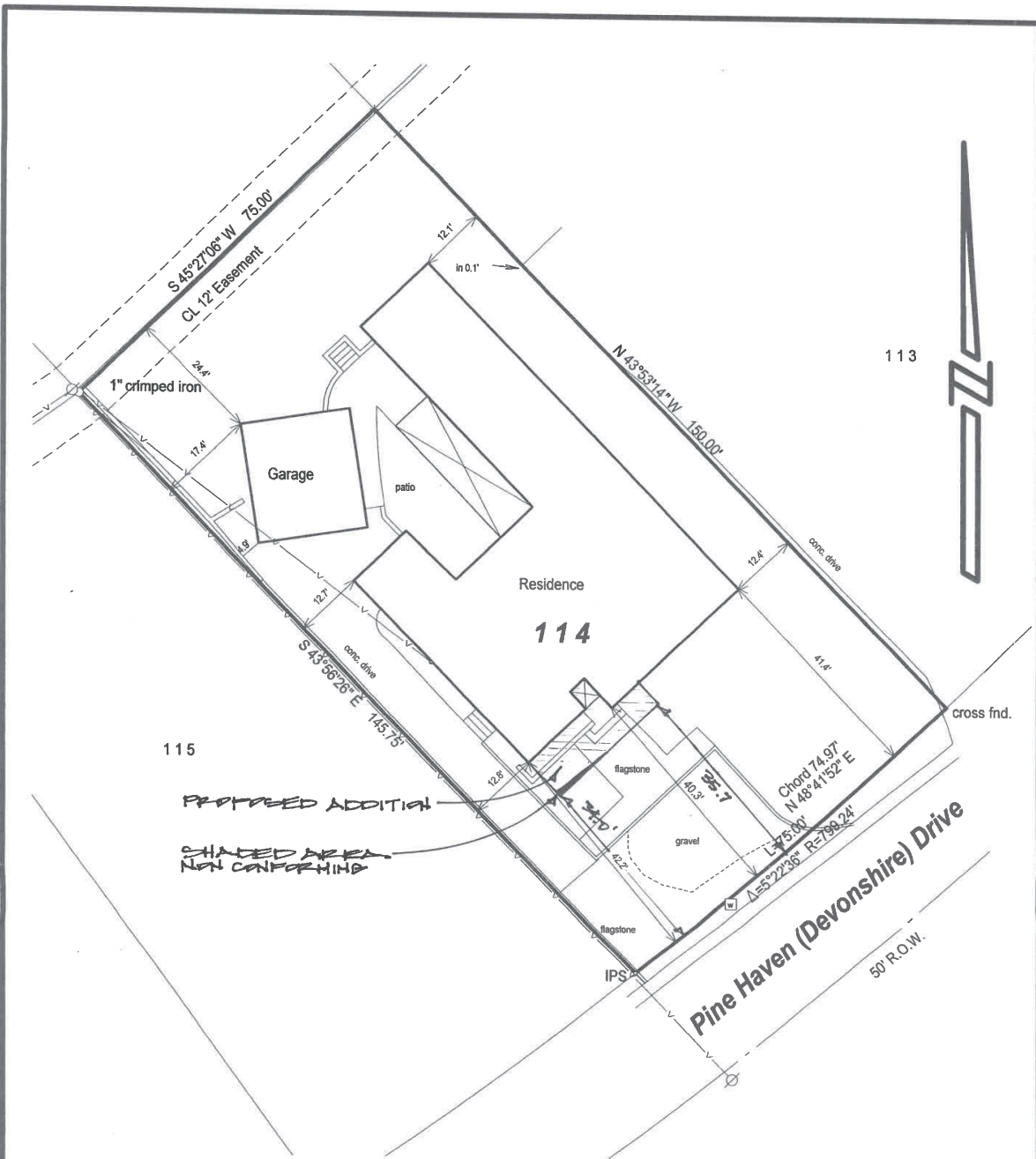
**Legend**

|                             |                    |
|-----------------------------|--------------------|
| ○ iron boundary marker      | ○ utility pole     |
| ⊙ open pipe frnd.           | ⊙ fire hyd.        |
| □ power box                 | △ tree             |
| ⊕ capped pipe frnd.         | ⊕ TV/tel. box      |
| ⊕ water valve               | + offset cross     |
| • guy anchor                | ⊕ commencing point |
| P.S. 5/8" rebar set 175.77' | ⊕ gas valve        |
| D Drain Manhole             | ⊕ Sanitary manhole |
| T Tel. Manhole              | ⊕ Sign             |
| M measured dim.             | ⊕ platted dim.     |
| W water meter               | ⊕ gas meter        |
| ⊕ power meter               | ⊕ Sign             |
| • chain link fence          |                    |
| — gas line                  |                    |
| — W water line              |                    |
| — overhead utility line     |                    |
| — wire fence                |                    |
| — wood fence                |                    |
| — center line               |                    |

Project No. 20201102  
As built Survey  
Ordered by Danza Paulovich  
Closing Coordinator  
The Fred Smith Group  
RealtySouth  
Cortey and David Tickle  
2938 Pine Haven Drive  
Mountain Brook, Alabama  
November 3, 2020



Scale 1" = 20 feet  
**SOUTHEASTERN SURVEYORS, INC.**  
Steven H. Gilbert, P.L.S.  
Alabama Reg. Land Surveyor No. 17507  
5160 Scenic View Drive  
Birmingham, Alabama 35210  
(205) 613-0375



STATE OF ALABAMA  
JEFFERSON COUNTY

I, Steven H. Gilbert, a Professional Land Surveyor in the State of Alabama, hereby certify to the parties listed below that the following is a true and correct copy of a map or plat of a survey made by me of the following described property:

Lot 112, Pine Crest, as recorded in Map Book 18, Page 64, in the Probate Office of Jefferson County, Alabama.

I further certify that the building(s) now erected on said property are within the boundaries of same except as may be shown; that there are no encroachments from adjacent property except as shown; that there are no Rights-of-way, Easements, or joint driveways over or across said land visible on the surface, except as shown; that there are no utility poles, guy wires, lines, structures, or supports therefor (excepting those that serve the premises only), except as shown; that I have consulted the Federal Insurance Administration Flood Hazard Boundary maps and found this property IS NOT located in a Flood Hazard Area (as determined by graphic plotting); and that all parts of this survey and drawing have been completed in accordance with the current requirements of the Standards of Practice for Surveying in the State of Alabama to the best of my knowledge, information, and belief.

FIRM Map No. 01073 C 0557 H September 3, 2010

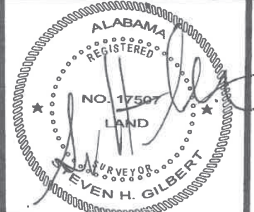
This survey was performed with conventional equipment and techniques. Horizontal and vertical control was established by GPS observations using NAVD 1988 vertical and NAD 83 horizontal datum. Bearings are based on Alabama State Plane Coordinates, West Zone. Corrections were obtained from the ALDOT CORS network.

This survey is invalid unless sealed in red ink.

Legend

|                           |                    |
|---------------------------|--------------------|
| ○ iron boundary marker    | ⊗ utility pole     |
| ⊙ open pipe fnd.          | ⊗ fire hyd.        |
| □ power box               | ± tree             |
| ⊙ capped pipe fnd.        | ⊗ TV/tel. box      |
| ⊕ water valve             | + offset cross     |
| • guy anchor              | ⊕ commencing point |
| PS 5/8" rebar set 17507   | ⊕ gas valve        |
| D Drain Manhole           | S Sanitary manhole |
| T Tel. Manhole            | △ Sign             |
| M) measured dim.          | (P) platted dim.   |
| W water meter             | G gas meter        |
| ⊕ power meter             | ⊕ Sign             |
| —•— chain link fence      |                    |
| —GAS— gas line            |                    |
| —W— water line            |                    |
| —v— overhead utility line |                    |
| —+— wire fence            |                    |
| — — wood fence            |                    |
| — — center line           |                    |

Project No. 20201102  
As built Survey  
Ordered by Danza Paulovich  
Closing Coordinator  
The Fred Smith Group  
RealtySouth  
Corley and David Tickle  
2938 Pine Haven Drive  
Mountain Brook, Alabama  
November 3, 2020



Scale 1" = 20 feet  
SOUTHEASTERN SURVEYORS, INC.  
Steven H. Gilbert, P.L.S.  
Alabama Reg. Land Surveyor No. 17507  
5160 Scenic View Drive  
Birmingham, Alabama 35210  
(205) 613-0375



December 17, 2021

Board for Zoning Adjustment  
City of Mountain Brook  
56 Church Street  
Mountain Brook, Alabama 35213

RE: 2938 Pine Haven Drive

Dear Board Members,

On behalf of Mr. and Mrs. David Tickle I submit a request for variance for the property at 2938 Pine Haven Drive. The Owners request relief from the front setback requirement of 35.0' to 34.0' in order to add a small addition to the front of the house.

As shown on the attached survey, the non conforming area will be a small sliver of approximately five square feet due to the curvature of the property line. Most of the addition is conforming, as the right portion of the house sits over five feet behind the front setback line.

Thank you for your consideration,

Very Truly Yours,

Carey F. Hollingsworth, III, AIA



## Variance Application Part II

### Required Findings (Sec. 129-455 of the Zoning Ordinance)

To aid staff in determining that the required hardship findings can be made in this particular case, please answer the following questions with regard to your request. **These findings must be made by the Board of Zoning Adjustment in order for a variance to be granted** (please attach a separate sheet if necessary).

What special circumstances or conditions, applying to the building or land in question, are peculiar to such building or land, and do not apply generally to other buildings or land in the vicinity (including size, shape, topography, location or surroundings)?

THE CURVATURE OF THE FRONT PROPERTY LINE RELATIVE TO THE POSITION OF THE EXISTING HOUSE IS A UNIQUE CIRCUMSTANCE RELATIVE TO THIS PARCEL

Was the condition from which relief is sought a result of action by the applicant? (i.e., *self-imposed hardship* such as: "...converted existing garage to living space and am now seeking a variance to construct a new garage in a required setback...")

No

How would the granting of this variance be consistent with the purpose and intent of the Zoning Regulations?

THE REQUESTED VARIANCE IS EXTREMELY SMALL AND WOULD NOT SET A PRECEDENT FOR FUTURE REQUESTS IF GRANTED



## Variance Application - Part I

### Project Data

Address of Subject Property 401 MICHAEL LANE

Zoning Classification RESIDENTIAL

Name of Property Owner(s) ANDREW AND TIFFANY LINN

Phone Number 205-837-8306 Email ALINN@southlandtransportationgroup.com

Name of Surveyor JACKINS BUTLER ADAMS INC.

Phone Number 205-870-3390 Email bbsurv@bellsouth.net

Name of Architect (if applicable) SMELCER DESIGN

Phone Number 205-229-3835 Email DJSMELCER@YAHOO.COM

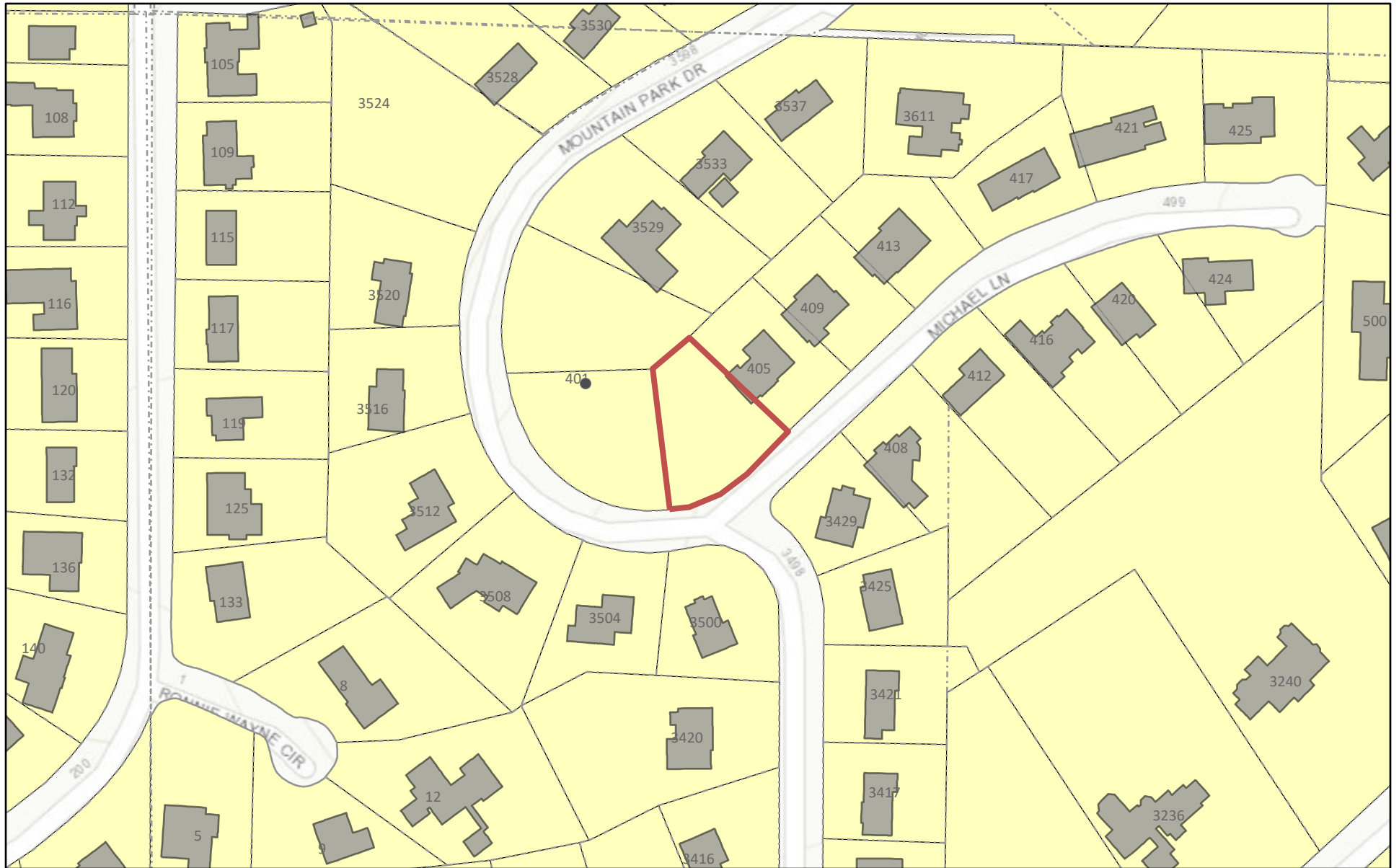
Property owner or representative agent must be present at hearing

Please fill in only applicable project information (relating directly to the variance request(s):




|  | Zoning Code Requirement | Existing Development | Proposed Development |
|--|-------------------------|----------------------|----------------------|
| Lot Area (sf)  |                         |                      |                      |
| Lot Width (ft)   |                         |                      |                      |
| Front Setback (ft) <i>primary</i>  | 40 FT                   |                      |                      |
| Front Setback (ft) <i>secondary</i>  |                         |                      |                      |
| Right Side Setback   |                         |                      |                      |
| Left Side Setback  |                         |                      |                      |
| Right Side Setback (ft):<br>For non-conforming narrow lots in Res-B or Res-C:<br>Less than 22' high →<br>22' high or greater → |                         |                      |                      |
| Left Side Setback (ft):<br>For non-conforming narrow lots in Res-B or Res-C:<br>Less than 22' high →<br>22' high or greater →  |                         |                      |                      |
| Rear Setback (ft)  |                         |                      |                      |
| Lot Coverage (%)   |                         |                      |                      |
| Building Height (ft)   |                         |                      |                      |
| Other  |                         |                      |                      |
| Other  |                         |                      |                      |

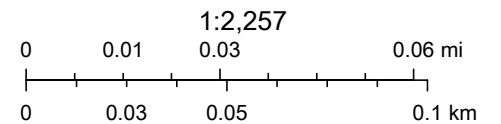


# A-22-29 Zoning



10/12/2022, 1:31:25 PM

-  Building Footprints 2020v1 Tax\_Parcels 2021
-  Lot Lines
-  Residence A District



JeffCoAL, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA, USDA

ArcGIS Web AppBuilder



# A-22-29 Aerial



10/12/2022, 1:33:39 PM

Aerial 2021



Green: Band\_2



Blue: Band\_3



Red: Band\_1

1:2,257

0 0.01 0.03 0.06 mi

0 0.03 0.05 0.1 km

Jefferson County Department of Information Technology , JeffCoAL, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA, USDA

ArcGIS Web AppBuilder



# Report to the Board of Zoning Adjustment

A-22-29

## ***Petition Summary***

Request to allow a retaining wall to be up to 10 feet in height in the front yard (Michael Lane) in lieu of the maximum allowed wall height of 4 feet.

## ***Background***

During an erosion control maintenance inspection of this construction site in August 2022, the wall in question was first noted by the city's Inspections Department. This wall was not a part of the permit submittal for construction, and to date no plan has been submitted to the city's Building Official related to the wall. The city has no documentation or engineered drawings for this structure.

## ***Scope of Work***

The scope of work for this site entails a proposed new single family dwelling with a front retaining wall.

## ***Variance Request for Retaining Wall Height in Front Yard***

**Nexus:** The applicant stated that the slope of the lot made the retaining wall necessary to facilitate the front drive access and to create a usable functional front yards. While it appears true that there is a grade change from the back to the front of the property, it seems as though the desire to create a functional front yard is driving the request for the variance more so than the need for driveway access.

## ***It is anticipated that an approval of such variance:***

- a. Could be detrimental to the streetscape (due to the massing and height)

## ***Impervious Area***

The proposal is in compliance with the allowable impervious surface area.

## ***Subject Property and Surrounding Land Uses***

The property contains a single-family dwelling, and is surrounded by same.

## ***Affected Regulation***

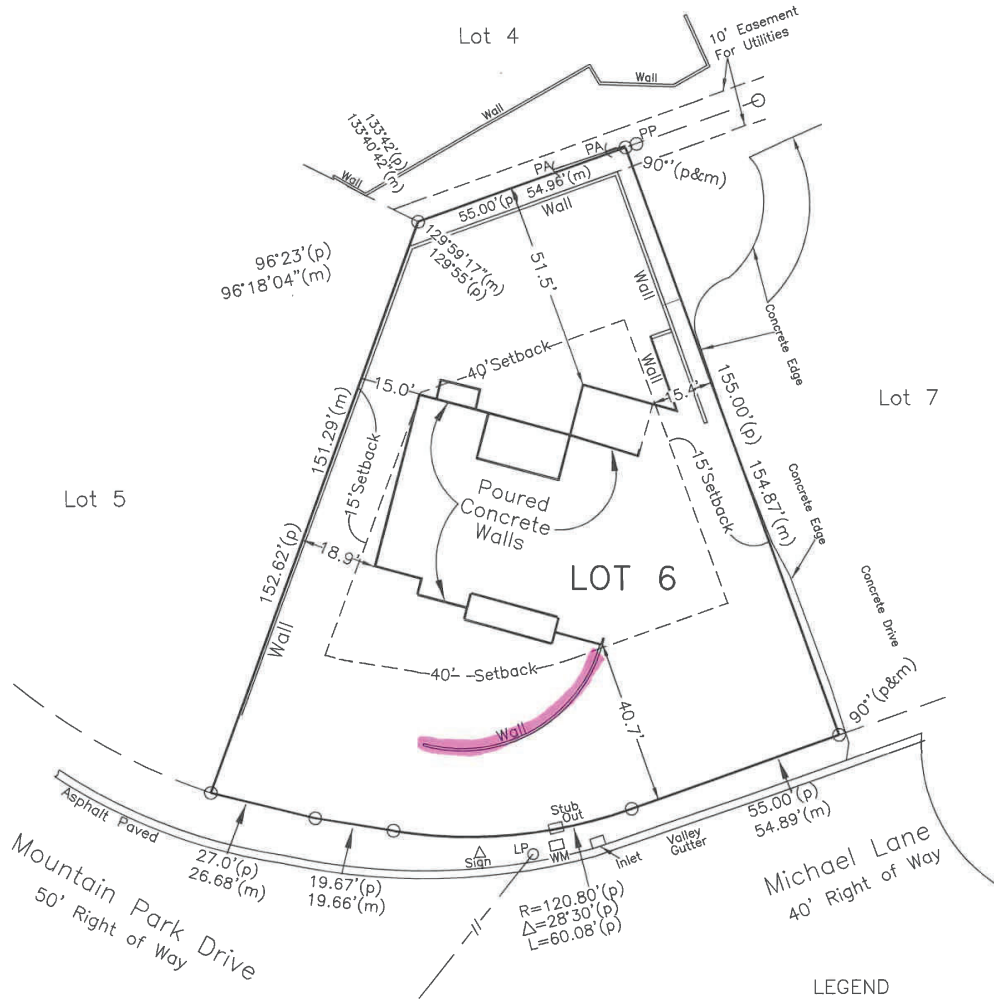
The proposal is in compliance with the allowable impervious surface area.

## ***Appends***

LOCATION: 401 Michael Lane

ZONING DISTRICT: Residence A District

OWNERS: Andrew and Tiffany Linn



## FOUNDATION SURVEY

### LEGEND

|       |    |                    |
|-------|----|--------------------|
| ○     | PP | POWER POLE         |
| ○     | LP | LIGHT POLE         |
| □     | WM | WATER METER        |
| □     | AC | AIR CONDITIONER    |
| —//—  |    | OVERHEAD POWER     |
| -x-   |    | FENCE              |
| 100x3 |    | SPOT ELEVATION     |
| (p)   |    | PLAT DIMENSION     |
| (m)   |    | MEASURED DIMENSION |

### Notes:

1. Date of Field Work = October 8, 2021;
2. Area of Lot 6 = 0.38 Acres
3. Site is Zoned Residence A District, per Mountain Brook Zoning Map; Setbacks: Front=40'; Rear=40'; Side=15'; Maximum Building Area = 25 percent of Total Area;
4. Date of Foundation Survey = July 19, 2022;

### CERTIFICATE

I hereby state that all parts of this survey and drawing have been completed in accordance with the Standards of Practice for Land Surveying in the State of Alabama to the best of my knowledge, information, and belief.

July 21, 2022  
Date

*Rowland Jackins*  
Rowland Jackins, Ala. PLS No. 18399



### FOUNDATION SURVEY

Lot 6, Donna Lynn Estates  
Mapbook 38, Page 8, Judge of Probate Office,  
Jefferson County, Alabama  
Scale: 1 Inch = 30 Feet July, 2022



JACKINS, BUTLER & ADAMS, INC.  
SURVEYING-GEOLOGY  
3430 INDEPENDENCE DRIVE, SUITE 30  
BIRMINGHAM, ALABAMA 35209  
(205) 870-3390  
S-1337/21-AAA2 Dwg. 1









SLATE BURGANIER  
EST. 1988  
See From the Partnership  
slateburganier.com

STOP

2025-864-4754







Google Maps 401 Michael Ln

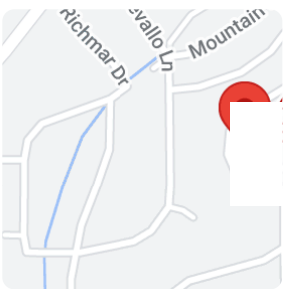


Image capture: Mar 2022 © 2022 Google

Mountain Brook, Alabama

Google

Street View - Mar 2022



Thursday, September 22, 2022

Dear Board of Zoning Adjustment,

Due to the hardships imposed by the shape and topographic nature of our lot, we are requesting your approval of a retaining wall that exceeds the height restriction of 4ft. Said retaining wall is necessary to ensure access to our front door from our driveway, to accommodate handicap accessibility and also to create a useable and functional front yard. We appreciate your consideration.

Sincerely,

Andrew and Tiffany Linn

*Homeowners*

401 Michael Lane

Mountain Brook, AL 35213



## Variance Application Part II

### Required Findings (Sec. 129-455 of the Zoning Ordinance)

To aid staff in determining that the required hardship findings can be made in this particular case, please answer the following questions with regard to your request. **These findings must be made by the Board of Zoning Adjustment in order for a variance to be granted** (please attach a separate sheet if necessary).

What special circumstances or conditions, applying to the building or land in question, are peculiar to such building or land, and do not apply generally to other buildings or land in the vicinity (including size, shape, topography, location or surroundings)?

DUE TO THE SEVERE SLOPE OF THE LOT A RETAINING WALL TALLER THAN 4 FEET IS REQUIRED TO FACILITATE THE FRONT DRIVEWAY ACCESS TO THE FRONT PARKING PAD AND TO CREATE A USABLE AND FUNCTIONABLE FRONT YARD.

Was the condition from which relief is sought a result of action by the applicant? (i.e., *self-imposed hardship* such as: "...converted existing garage to living space and am now seeking a variance to construct a new garage in a required setback...")

NO.

How would the granting of this variance be consistent with the purpose and intent of the Zoning Regulations?

IT WOULD ALLOW A RETAINING WALL TO BE BUILT FOR A DRIVEWAY AND USABLE FRONT YARD.



October 13, 2022

City of Mountain Brook  
Dana Hazen  
Director of Planning, Building and Sustainability  
56 Church Street  
Mountain Brook, AL 35213

Dear Ms. Hazen,

I am writing regarding the notice for the following appeal: Case A-22-29: Andrew and Tiffany Linn, property owners, request variances from the terms of the Zoning Regulations to allow a retaining wall to be up to 10 feet in height in the front yard (Michael Lane) in lieu of the maximum allowed wall height of 4 feet. 401 Michael Lane.

I will be in Denver on business at the time of the hearing, therefore I am writing to you so that my letter can be submitted for discussion in my absence.

My home is directly across the street from this residence. As you are aware, the land on which the residence sits was split into three separate parcels. There are now three *very large* homes sitting where one moderately sized home used to be. Overbuilding on this land has created much water runoff.

My main concern is that a retaining wall that diverts more water off the Linn's property will continue to affect our house (and our neighbors downstream, whose garages take on water during rainfall). The water coming from the Linn's property has caused significant damage to our home, as erosion is shifting it. This is evident in our daughter's newly renovated bathroom via cracking grout as well as our sidewalk sinking 6 inches and shifting since construction began.

The infrastructure simply cannot handle all the water and debris runoff now that the sites were cleared and built upon. This may need to be addressed with the city, as updated drainage has not occurred since the land has been altered.

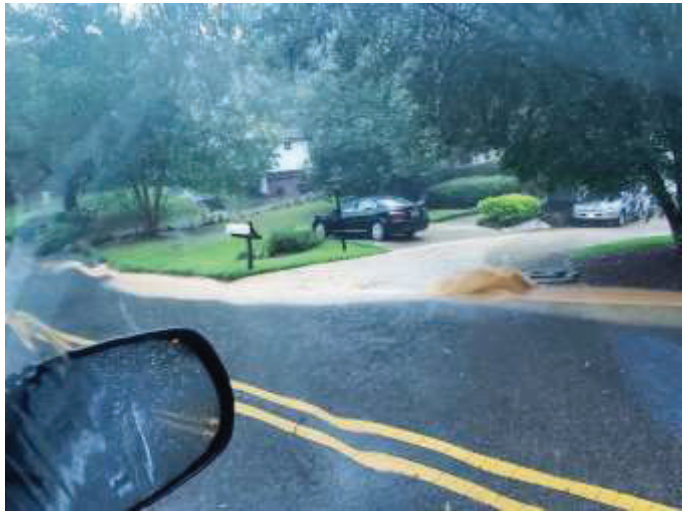
Based on our observation, the retaining wall (*WHICH ALREADY EXISTS*) could be brought into height conformity by cutting it down to 2 ft off grade and adding steps to the front door for the difference of height. Steps to a front door are a common solution for grade issues. If cutting the wall and adding steps cannot be achieved the wall should be removed and another option considered, as the base of the wall stands 15 ft-20 ft off street level to 30 ft at the top, creating a very uninviting façade. This creates a fortress effect, which is not fitting for the neighborhood. It's simply a horrible sight from street view.

I have included pictures for your review.

Respectfully,

Nicole Boomhover  
3500 Mountain Park Drive

CC: Sam Gaston  
Glenn Merchant













## SCOPE OF WORK

### Proposal for Professional Services Related to 401 MICHAEL LANE DRAINAGE PLAN SLATE BARGANIER BUILDING November 29, 2021

DRAFT

FINAL

#### Project Objectives:

Slate Barganier Building (Client) office is located at 3121 Blue lake Drive, Vestavia, AL 35243 and requiring a drainage evaluation and remediation of lot 401 Michael Lane. Client wishes to engage InSite Engineering, LLC ("InSite") to evaluate pre-development and post-development flows and provide remediation solutions. A preliminary site visit by InSite revealed an increase in impervious area is causing an increase of storm water runoff and will have to be addressed to be in compliance with the City of Mountain Brook Drainage Ordinance.

At this time, InSite believes that it is possible to remedy the problem by conducting an evaluation of post-development flows and compare them to the pre-development flows. With this information a detention facility can be designed to accommodate this increase in flow from the site and hold to achieve a peak discharge amount that is equal to or less than the pre-development condition.

#### Work: Work Engagement

Under the terms of this agreement, InSite will execute the following Scope of Work:

1. Evaluate the size and placement of all storm-related appurtenances to the home;
2. Determine expected stormwater flows during rain events;
3. Design appropriate drainage remedies for the control of post development runoff and satisfy the drainage ordinance of the City of Mountain Brook; and
4. Propose remedies in a set of engineering drawings suitable for permit approval and construction.

Under the terms of this agreement, the Client agrees to provide InSite Engineering LLC with all necessary information related to the Scope of Work. The following Key Assumptions will govern each engagement unless otherwise agreed between the Client and InSite Engineering LLC

#### **Key Assumptions:**

1. Unless specifically requested, InSite Engineering LLC will not be responsible for any geotechnical investigations, or evaluation of structural integrity of any existing building, building appurtenance, or physical structure already in place.
2. The Client may request additional services within the overall scope of services offered by InSite Engineering LLC, and such services will be provided with prior authorization under the terms and conditions stated herein.
3. Nothing in this contract shall exclude the Client from seeking services from other firms or individuals.
4. Final work product shall be agreed by the Client and InSite Engineering LLC and billed upon completion.



**Key Staff Hours:** *Sr. Professional Engineer – 10 hrs*

*Project Engineer – 10 hrs*

**Expected Completion Date:** Within one week of engagement.

**Deliverable:** Drainage evaluation calculations and details of detention facility.

## Project Engineering Fee

### **Cost:**

To avoid misunderstanding, cost for each individual engagement will be pre-authorized by the Client based on the needs and scope of each individual engagement based on InSite Engineering LLC hourly rates. No deviations from the Scope of Work will be made without prior written consent from the Client. Authorized work will be billed on a time and materials basis at InSite rates included herein upon completion of each engagement.

**Project Cost:** \$2,500.00

**Billed As:**

- Lump Sum
- Not-to-Exceed Budget
- Cost Plus Fixed Fee
- Periodic Time and Materials Progress Payment







Professional and Technical Services

The following classifications and associated unit rates are general and will be used as guidelines for the services of professional disciplines offered. Legal preparation and testimony are billed at two times these rates. Rates are subject to be updated once annually.

| <b>Classification</b>           | <b>Rate/Hour</b> |
|---------------------------------|------------------|
| Principal Engineer              | \$150.00         |
| Sr. Professional Engineer       | \$125.00         |
| Professional Engineer           | \$100.00         |
| Engineer Intern                 | \$85.00          |
| GIS/IT Engineer                 | \$125.00         |
| GIS/IT Technician               | \$90.00          |
| Sr. Civil Designer              | \$115.00         |
| Civil Designer                  | \$90.00          |
| CADD Technician                 | \$65.00          |
| Administrative/Clerical         | \$50.00          |
| Resident Project Representative | \$60.00          |
| Student Intern                  | \$50.00          |

| <b>Reimbursable Expenses</b>          | <b>Rate/Hour</b> |
|---------------------------------------|------------------|
| Automobile Travel                     | Current IRS Rate |
| Other travel and subsistence expenses | Cost +15%        |
| Subconsultant Services                | Cost + 15%       |
| Agency Review Fees                    | Cost + 15%       |
| Outside Printing and Plotting Fees    | Cost + 15%       |
| Other Reimbursable Expenses           | Cost + 15%       |

**In-House Printing and Plotting Fees:**

|   |               |
|---|---------------|
| 24" x 36" Black and White Prints/Plots  | \$2.00/sheet  |
| 12" x 18" Black and White Prints/Plots  | \$1.00/sheet  |
| 8.5" x 11" Black and White Prints/Plots | \$0.10/page   |
| 24" x 36" Color Prints/Plots            | \$16.00/sheet |
| 12" x 18" Color Prints/Plots            | \$8.00/sheet  |
| 8.5" x 11" Color Prints/Plots           | \$0.45/page   |
| Large Format Scanning                   | \$3.25/sheet  |
| Small Format Scanning                   | \$1.00/page   |

Effective January 1, 2021  
(Replaces Schedule of Fees dated January 1, 2019)





## WORK ORDER

**DATE ORDERED** November 29, 2021

**JOB NO.** \_\_\_\_\_

|  |  |
|--|--|
| <b>CLIENT</b> Slate Barganier Builders | <b>DESCRIPTION OF PROJECT</b>  |
| <b>ADDRESS</b> 3121 Blue Lake Drive    | City of Mountain Brook Drainage Ordinance Evaluation and remediation at 401 Michael Lane |
| Vestavia, AL 35243                     |  |
|  |  |

| <input type="checkbox"/> SURVEYING  | <input checked="" type="checkbox"/> ENGINEERING  | <input type="checkbox"/> DRAFTING  |
|---|--|--|
| <input type="checkbox"/> Boundary<br><input type="checkbox"/> Description<br><input type="checkbox"/> Topographic<br><input type="checkbox"/> Utility<br><input type="checkbox"/> As Built<br><input type="checkbox"/> Title Plat<br><input type="checkbox"/> Construction Staking<br><input type="checkbox"/> Other: _ | <input type="checkbox"/> Engineering Report<br><input type="checkbox"/> Grant Application<br><input checked="" type="checkbox"/> Design<br><input type="checkbox"/> Construction Plans<br><input type="checkbox"/> Specifications<br><input type="checkbox"/> Subdivision — Preliminary<br><input type="checkbox"/> Subdivision — Final Plat<br><input type="checkbox"/> Other: <u>Drainage Calculations</u> | <input type="checkbox"/> Boundary Map<br><input type="checkbox"/> Title Plat<br><input type="checkbox"/> Plot Plan<br><input checked="" type="checkbox"/> Topographic Map<br><input type="checkbox"/> Utility Map<br><input type="checkbox"/> Construction Plans<br><input type="checkbox"/> Subdivision Plat<br><input type="checkbox"/> Other: _ |

### REMARKS

- All work to be completed according to Scope of Work attached dated November 29, 2021
- No changes in scope will be made without prior written consent from the Client.
- InSite Engineering LLC will initiate this project upon of receipt of written authorization to proceed. Planned completion dates for specific task will be agreed in writing between the Client and InSite Engineering LLC
- This project will be conducted under the terms and conditions indicated by the checked box below.
  - InSite Engineering LLC general terms and conditions attached.
  - Specific Contract between the Client and InSite Engineering LLC dated \_\_\_\_\_ .
  - Client Purchase Order Number \_\_\_\_\_ , dated \_\_\_\_\_ .
- This work order should be signed by an authorized representative for the Client. Formal authorization in the form of this signed agreement must be received prior to commencing work.
- By signing this Work Order, The Client agrees and accepts the terms of this written agreement as contractually binding between The Client and InSite Engineering LLC
- This written agreement constitutes the whole agreement between The Client and InSite Engineering LLC and not other conditions, written or otherwise, other than those stated herein apply.
- Payment is due upon completion of the agreed work and receipt of invoice or, if the project is ongoing, due monthly upon receipt of invoice. If work is not completed due to no fault of InSite Engineering LLC payment will be due for services to date. In the event of payment not being made and a lawyer is employed, the Client will be liable for any and all legal fees necessary for debt collection.

**Authorized By:**  
Slate Barganier Building

|           |
|-----------|
| Signature |
| Name      |
| Title     |
| Date      |

**InSite Approval By:**

|           |                      |
|-----------|----------------------|
| Signature |                      |
| Name      | Matt S. Golab, P.E.  |
| Title     | Sr. Project Engineer |
| Date      | November 29, 2021    |





## WORK ORDER

---

---



## TERMS AND CONDITIONS

1. References herein to "InSite" refer to InSite Engineering LLC, "Client" shall mean **Community Services Programs of West Alabama, Inc. (Tuscaloosa, Alabama)**. References herein to "Project" mean the project as defined in InSite written Scope of Work or proposal to the Client. Any proposal submitted by InSite for the performance of a proposed Project shall be firm for a period of sixty (60) days. Upon the expiration of such period, InSite reserves the right to modify the proposed basis of payment and fees to allow for changing costs and to adjust the time of performance to confirm to changing work loads.

2. Unless InSite's proposal provides otherwise, the proposed fees constitute InSite's estimate of the probable cost required to complete the proposed Project. The estimated probable cost identified in InSite's proposal shall not be deemed to be either a guaranteed maximum or "guaranteed not-to-exceed" amount with respect to the cost of performing the Project identified in any such proposal. However, in performing any Project, InSite will not proceed to expend more than the amount identified as the estimated probable cost in InSite's proposal without the Client's prior approval.

3. Cost and schedule commitments contained in InSite's proposal shall be subject to renegotiation for unreasonable delays caused by the Client's failure to provide specified facilities or information or for delays caused by unpredictable occurrences such as fires, floods, strikes, riots, unavailability of labor or materials or services, process shutdown, acts of God or of the public enemy, or acts of regulations of any governmental agency. Work stoppage or interruption caused by any of the above may result in additional cost (requiring a change in scope) beyond that identified in InSite's proposal for performance of the Project, entitling InSite to an adjustment to the cost and schedule.

4. Payment. Where the method of payment for InSite's services is on a time-and-material or cost reimbursable basis, the following commercial terms shall apply:

a. The minimum time segment for charging of field work is four (4) hours. For work done at any of InSite's offices, the minimum time segment for charging is one-half hour. There is no premium charge for overtime.

b. Where any agreement is based on the salary cost of specific individuals, normal and customary salary increases will become effective immediately upon InSite authorization and will be reflected in the next invoice submitted to the Client.

c. Expenses properly chargeable to the Project shall include: travel and living expenses of InSite personnel on business connected with the project; shipping costs; reproduction and bindery costs at InSite's standard rates; equipment rental charges; professional, analytical and technical subcontractors and advisors retained in connection with the Project; identifiable drafting and stenographic supplies; and expendable materials and supplies purchased specifically for the Project. A 15 percent handling and administrative charge will be added to all third party Project expenses. In lieu of all other itemized telephone and facsimile communication charges, and computer support, a telecommunications charge/computer support charge of five percent of the amount of InSite labor charges reflected on each invoice MAY be billed to defray these costs. If the services covered by any InSite proposal are subject to local or state taxes or fees, such additional costs will be charged to the Project and reimbursed by the Client.

5. Invoices. Invoices will be submitted on a monthly basis payable upon receipt. Unpaid balances shall be subject to interest at the rate of 1.5 percent per month or the maximum permissible under state law, whichever is less, starting 30 days from the invoice date. Payments received will be applied first to any unpaid fees. In addition, InSite may, after giving seven (7) days written notice, suspend services under any agreement without liability until all past due accounts (including fees and accrued interest) have been paid. Timely payment is a substantial condition of Client's performance of any agreement between InSite and Client. In the event InSite must take legal action to be paid for its services and prevails, all collection and legal costs associated with such action shall be reimbursed by the Client.

6. Except as provided in Paragraph 5, any agreement may be terminated in whole or in part in writing by either party in the event of substantial or material failure by the other party to fulfill its obligations under such agreement through no fault of the terminating party, provided that no such termination shall be effective unless the other party is given 1) not less than ten (10) calendar days written notice of intent to terminate and 2) an opportunity for consultation with the terminating party prior to the effective date of such termination. A final invoice will be calculated on the first or

fifteenth of the month (whichever comes first) following the effective date of termination.

a. Where the method of payment is based on a "lump sum" the final invoice will be based on the percentage of the work completed up to the effective date of termination.

b. Where the method of payment is based on time and materials, the final invoice will be based on reimbursement for all services and expenses associated with the Project up to the effective date of termination.

c. Where the method of payment is based on cost plus a fixed fee, the final invoice will be based on reimbursement for all costs up to the effective date of termination and a pro-rata share of the fixed fee.

d. Where the method of payment is based upon a payment schedule, a payment schedule will be attached to and made part of these terms as "Exhibit A – Periodic Payment Schedule" and signed by all parties to this agreement.

For each of the above methods of preparing the final invoice, there shall be an additional charge for Project closeout equal to three percent of all Project billings up to the effective date of termination. This closeout charge shall not be considered a penalty, but represents an allowance for recovery of costs for demobilization and reassignment of personnel and equipment on short notice.

7. Right-of-Entry. Client agrees to grant InSite the right to:

a. Enter or access any and all property necessary as required to complete the Scope of Work;

b. Perform the engineering services described in the Scope of Work;

c. Cut or remove any vegetation necessary and remove any other objects interfering with the completion or progression of the Project; and

d. Assign without notice this agreement or any part thereof as InSite shall deem necessary for the completion of the Project.

8. Insurance. Client agrees that InSite's liability for professional negligent acts, errors, or omissions under this agreement shall be limited to the amount of the fee charged, unless an additional fee of 5% of the liability amount desired by the Client to be paid to InSite. Additional liability insurance amounts requested by the Client will be attached to and made part of these terms as "Exhibit B – Additional Liability Insurance" and signed by all parties to this agreement.

9. Indemnification

a. InSite shall indemnify and hold harmless the Client, its directors, officers, employees, and agents from and against all liability, claims, suits, losses, damages, costs and demands, including reasonable legal expenses and attorney's fees connected therewith, on account of personal injury, including death, or property damage, sustained by any person or entity not a party to any agreement between InSite and Client and arising out of or connected with the performance of such agreement, to the extent such injury, death or damage is caused by the sole or contributory negligence or willful misconduct of InSite or its subcontractors or their respective employees, officers and agents; provided that such injury, death or damage is not occasioned by the sole negligence of Client or its contractors or their respective employees, officers and agents; and provided further, that InSite's liability under this indemnity provision shall be limited to and not exceed the insurance coverages and associated limits of liability which InSite is required to secure pursuant to Paragraph 7, hereof; and provided further, that InSite's obligation hereunder shall not exceed to indemnification or holding harmless of a party indemnified hereunder for any claims of loss of profits or any other indirect, special, incidental or consequential damages of any nature whatsoever.

b. Client shall indemnify and hold harmless InSite and its directors, officers, employees, and agents from and against all liability, claims, suits, losses, damages, costs and demands, including reasonable legal expenses and attorney's fees connected therewith, on account of personal injury, including death, or property damage, sustained by any person or entity not a party to any agreement between



## TERMS AND CONDITIONS

InSite and Client arising out of or connected with the performance of such agreement, to the extent such injury, death or damage is caused by the sole or contributory negligence or willful misconduct of Client or its contractors or their respective employees, officers and agents; provided that such injury, death or damage is not occasioned by the sole negligence of InSite or its subcontractors or their respective employees, officers and agents; and provided further, that Client's obligation hereunder shall not extend to indemnification or holding harmless of a party indemnified hereunder for any claims of loss of profits or any other indirect, special, incidental or consequential damages of any nature whatsoever.

c. The provisions of this Paragraph 8 shall survive the completion of the Project or the expiration, cancellation or termination of any agreement between InSite and Client.

### 10. Standard of Care

a. While performing services under any agreement, InSite shall exercise that degree of care and skill ordinarily exercised under similar circumstances by members of the civil engineering and consulting profession performing the kind of services to be performed thereunder and practicing in the same or similar locality at the same time and that the proper venue for litigation of any cause or action hereto shall be that court of jurisdiction in Tuscaloosa County, Alabama.

b. Client agrees that InSite shall not be responsible or liable in any way for the conduct, work, or damages or resulting loss incurred by any action by any subcontractor(s) associated with this Project.

b. Except for the express promise set forth in subparagraph a., above, regarding InSite's standard of care, InSite neither makes, nor offers, nor shall InSite be liable to Client for any express or implied warranties with respect to the performance of InSite's services. Estimates of cost, approvals, recommendations, opinions, and decisions by InSite are made on the basis of InSite's experience, qualifications, and professional judgment and are not guaranteed. InSite shall not be regarded as a guarantor with respect to any work product provided to Client. **THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY WAIVED BY CLIENT.**

c. InSite agrees to reperform and correct at its expense any work or services performed by InSite which fails to conform to the standard of care that InSite has accepted pursuant to subparagraph a., above.

d. In no event shall InSite and InSite's officers, directors, employees, agents and independent professional consultants, and any of them, be liable to Client and/or anyone claiming by, through or under Client, including Client's insurers, for any lost, delayed, or diminished profits, revenues, or opportunities; losses by reason of shutdown or inability to utilize or complete work at the site of the Project; or any other incidental, special, indirect, or consequential damages of any kind or nature whatsoever resulting from InSite's performance or failure to perform services pursuant to any agreement.

e. InSite and InSite's officers, directors, employees, agents and independent professional consultants, and any of them, shall not be liable to Client and/or anyone claiming by, through or under Client, including Client's insurers, nor shall InSite be liable to indemnify Client pursuant to Paragraph 8, hereof, in an amount which exceeds (i) the total compensation value to InSite of the Project, if the claims of Client or Client's insurers against InSite are not covered by the insurance coverages and associated limits of liability which InSite is required to maintain pursuant to Paragraph 7 hereof or (ii) the liability amount specified in Paragraph 7, if the claims of Client or Client's insurers against InSite are covered by the insurance coverages and associated limits of liability which InSite is required to maintain pursuant to Paragraph 7 hereof. The Client hereby forever releases InSite and its officers, principals, employees and agents from any liability for losses or damages sustained and incurred by the Client in excess of such amount.

f. As used in Paragraph 9, the term "liable" or "liability" means liability of any kind, whether in contract (including breach of warranty), in tort (including negligence, whether of InSite or others), in strict liability, for indemnity, or otherwise, for any and all injuries, claims, losses, expenses or damages whatsoever arising out of or in any way related to InSite's services from any cause or causes

whatsoever, including but not limited to the negligence, errors, omissions, strict liability or breach of contract of InSite and/or InSite's officers, directors, employees, agents and independent professional consultants, or any of them. The provisions of this Paragraph 9 providing for limitations of and protections against InSite's liability shall survive the completion of the Project or the expiration, cancellation, or termination of any agreement between InSite and Client, and such provisions shall apply to the full extent permitted by law.

11. Client agrees that InSite has authority to use its name as a Client and a general description of the Project as a reference for other prospective Clients. All original papers and documents and all work products and copies thereof, produced as a result of this agreement, shall remain the property of InSite and may be used by InSite without prior consent of the Client.

12. If InSite personnel are called or subpoenaed for depositions, examination, or court appearances in any dispute arising out of the Project, InSite shall be reimbursed on a time and material basis in accordance with InSite's then current, standard billing rates for such matters, including all out-of-pocket costs incurred in connection with such matters.

13. If any of these General Terms and Conditions shall be finally determined to be invalid or unenforceable in whole or in part, the remaining provisions hereof shall remain in full force and effect and be binding upon the parties. The parties agree to reform the contract between them to replace any such invalid or unenforceable provision with a valid and enforceable provision that comes as close as possible to the intention of the stricken provision.

14. Once the Client has signified its acceptance of InSite's proposal, the express terms of InSite's proposal to Client and these General Terms and Conditions shall constitute the complete and exclusive statement of the terms of the agreement between the parties and are intended as a final expression of the terms of such agreement for the proposed work and will supersede all prior and contemporaneous agreements, representations or conditions, express or implied, oral or written. No provision of InSite's proposal or these General Terms and Conditions may be waived, altered, or modified in any manner, unless the same shall be set forth in writing and signed by a duly authorized officer of InSite. Client may use its standard business forms (such as purchase orders) to administer any agreement between InSite and Client, but use of such forms shall be for convenience purposes only, and any typed provision in conflict with the terms of InSite's proposal or these General Terms and Conditions and all pre-printed terms and conditions contained in or on such forms shall be deemed stricken and null and void.



December 6, 2021

Mr. Glen Merchant, Building Official  
The City of Mountain Brook  
56 Church Street  
Mountain Brook, Alabama 35213

**Subject: 401 MICHAEL LANE  
SUBMITTAL OF DRAINAGE PLAN AND CALCULATIONS  
SLATE BARGANIER BUILDING**  
InSite Project No. 21146.00

Dear Mr. Merchant:

At the request of the Slate Barganier Building, InSite Engineering conducted an analysis of the storm water impact of the development of the lot located at 401 Michael Lane. The goal of this analysis is to use the data generated to evaluate the increase, if any, of storm water as created by the proposed residential dwelling and the associated increase of impervious surface. Additionally, a plan for the capturing and detaining any increased runoff generated, to a point that would match or decrease the flow from the site on all required storm-return periods as required by the City of Mountain Brook would be developed. The associated plan and detail for this plan would be designed and included.

#### **METHODOLOGY**

The basin was analyzed using the SCS Method. The SCS Method is an empirical method of rainfall abstraction based on the potential for the soil to absorb a certain amount of moisture and is commonly used and widely accepted method of determining peak flows for a given watershed. Natural Resources Conservation Service (NRCS) maps were used to determine the soils in the area and are attached to this report. It is necessary to determine the soil type, and absorption qualities, to classify the soils into groups. The group that a soil is classified into has a direct correspondence to the determining of the Curve Number used in the SCS Method Calculations. Slate Barganier provided InSite Engineering with topography, on one foot contour intervals, to allow for a more detailed determination of slope in the watershed. The slope is another critical factor in the determination of the Curve Number for the soil and/or other impervious improvements. This allowed for more accurate approximations of time of concentrations and Curve Number adjustments. USGS Quadrangle maps were also utilized in the development of the basin and the corresponding sub-basins.

Once all the information required to develop the watershed was gathered, the calculations were performed on the basin. During the evaluation of the basin, sub-basins were developed to determine flows more accurately from areas of the site. These sub-basins were then routed to the outfall point for the basin. A peak flow at the outfall point was determined on all storm return periods. For this evaluation, the storm return periods that were analyzed, and included in this report, were the 2, 5, 10, 25, 50, and 100 year storm return periods.



Upon completion of the watershed analysis, and the obtaining of a peak flow for the storm return periods, the site and proposed grading were evaluated to determine options for detaining the post-development flow at the given flow situation. Various programs were utilized to obtain performance curves, storage rates, free board, and associated storage criteria. The findings for both the basin analysis, including time of concentration calculations and the pipe performance evaluation are detailed below.

## **FINDINGS**

The basin was analyzed and determined to encompass approximately 0.39 acres +/- . This was based on the topography provided by the Slate Barganier. Upon further examination the basin was then divided into 2 pre-development sub-basins and 5 post-development sub-basins. This was based on topography, travel path properties for the lot. The sub-basins are shown on maps in attached to this report.

The soils in this area were determined using the NRCS soil maps and were found to be “very poorly drained” for all the basins. This along with other references pushed all of the watershed into the SCS Soil Group D. The soil map and the listings of the soil in the area can be found attached to this report.

## **PRE-DEVELOPMENT SUB-BASINS**

The pre-development sub-basins were evaluated, and flows were determined. The report generated can be found attached to this report. However, a summary of the two pre-development sub-basins are listed below:

**Pre-Development Sub-Basin 1** is the southern portion of the site. This basin was determined, combined with sub-basin 2 and then a reach to the outfall location of the basin was utilized. This Sub-basin contained “very poorly drained” soils.

Area = 0.09 acres  
Curve Number (CN):  
    0.02 acres = CN of 85  
    0.07 acres = CN of 84  
    Composite Curve Number = 84  
Time of Concentration = 2 minutes  
25-year Storm Return = 0.544 cfs

**Pre-Development Sub-Basin 2** is the northern portion of the site. This basin was determined, combined with sub-basin 2 and then a reach to the outfall location of the basin was utilized. This Sub-basin contained “very poorly drained” soils.

Area = 0.30 acres  
Curve Number (CN):  
    0.05 acres = CN of 83  
    0.12 acres = CN of 86  
    0.06 acres = CN of 98  
    Composite Curve Number = 88  
Time of Concentration = 3.7 minutes  
25-year Storm Return = 2.468 cfs

Upon determination of the sub-basins, they were each combined and routed as necessary to model accurately the drainage patterns of the basin. This resulted in the determination of a peak



flow for all the storm return periods. The detailed summary of this can be found attached to this report. However, a summary of the peak flow at the outfall of the watershed is listed below:

**2-year storm return period = 1.315 cfs**  
**5-year storm return period = 1.683 cfs**  
**10-year storm return period = 2.004 cfs**  
**25-year storm return period = 2.468 cfs**  
**50-year storm return period = 2.846 cfs**  
**100-year storm return period = 3.239 cfs**

### **POST-DEVELOPMENT SUB-BASINS**

The post-development sub-basins were evaluated, and flows were determined. The report generated can be found attached to this report. However, a summary of the five post-development sub-basins are listed below:

#### **Post-Development Sub-Basin 1**

Area = 0.10 acres  
Curve Number (CN):  
    0.02 acres = CN of 98  
    0.08 acres = CN of 83  
    Composite Curve Number = 84  
Time of Concentration = 2 minutes  
25-year Storm Return = 0.605 cfs

#### **Post-Development Sub-Basin 2.**

Area = 0.06 acres  
Curve Number (CN):  
    0.04 acres = CN of 83  
    0.02 acres = CN of 98  
    Composite Curve Number = 88  
Time of Concentration = 2.1 minutes  
25-year Storm Return = 0.387 cfs

#### **Post-Development Sub-Basin 3.**

Area = 0.03 acres  
Curve Number (CN):  
    0.01 acres = CN of 98  
    0.02 acres = CN of 85  
    Composite Curve Number = 89  
Time of Concentration = 2 minutes  
25-year Storm Return = 0.194 cfs



#### **Post-Development Sub-Basin 4.**

Area = 0.03 acres  
Curve Number (CN):  
    0.02 acres = CN of 98  
    0.01 acres = CN of 85  
    Composite Curve Number = 94  
Time of Concentration = 2 minutes  
25-year Storm Return = 0.208 cfs

#### **Post-Development Sub-Basin 5**

Area = 0.17 acres  
Curve Number (CN):  
    0.10 acres = CN of 98  
    0.02 acres = CN of 85  
    0.05 acres = CN of 86  
    Composite Curve Number = 93  
Time of Concentration = 2.9 minutes  
25-year Storm Return = 1.166 cfs

Upon determination of the sub-basins, they were each combined and routed as necessary to model accurately the drainage patterns of the basin. This resulted in the determination of a peak flow for all the storm return periods. The detailed summary of this can be found attached to this report. However, a summary of the peak flow at the outfall of the watershed is listed below:

**2-year storm return period = 1.411 cfs**  
**5-year storm return period = 1.778 cfs**  
**10-year storm return period = 2.097 cfs**  
**25-year storm return period = 2.559 cfs**  
**50-year storm return period = 2.935 cfs**  
**100-year storm return period = 3.326 cfs**

#### **REQUIRED DETENTION AREAS**

Upon completion of the analysis, it was determined that the proposed residential site plan caused an increase in storm water runoff on all storm return periods. The basins were then evaluated and routed to create detention within the site to achieve reduction of the runoff amounts to that equal to or less than the pre-development conditions. To achieve these results for this site, two detention areas were required to achieve the necessary reduction in flows. These two areas are referred to as the upper detention area and the lower detention area. These areas will be utilized to detain the flow to a point that the peak flow for all storm return periods will be less than or equal to the pre-development flows.

Both detention areas are utilizing six-inch drop pipes to achieve the necessary reduction in peak flow amounts. These structures and locations are detailed on the drainage plan drawing as attached to this report. These detention areas will tie to proposed storm sewer that is being installed as part of the lot development and is detailed on the attached drawings as well. Performance of both of the detention areas are detailed in the attached hydraulic analysis, however, a summary of the peak outflows for the lot when utilizing are listed below along with the pre-development peak flow for comparison.





| Storm Return Period | Pre-Development Flow (CFS) | Post-Development Flow (CFS) |
|---------------------|----------------------------|-----------------------------|
| 2                   | 1.315                      | 1.316                       |
| 5                   | 1.683                      | 1.631                       |
| 10                  | 2.004                      | 1.844                       |
| 25                  | 2.468                      | 2.125                       |
| 50                  | 2.846                      | 2.356                       |
| 100                 | 3.239                      | 2.602                       |

## CONCLUSIONS

The proposed development as originally arranged created an increase of peak flow from storm water runoff on all the storm return periods. Upon evaluation, it was determined that there was a need for detention to control this peak flow increase. Based on site topography, and the proposed grading for the residential development, a plan was designed that generated a post-development peak flow that was either reduced or matched the pre-development peak flow for this basin. This design includes the utilization of two (2) detention areas that are detailed in the attached documentation.

It is in my opinion that the development of 401 Michael Lane will have no adverse effects on downstream drainage if the project is constructed in accordance with the plans and details prepared by our firm for the grading and detention. However, construction of this site will be at the discretion of the owner and I, as engineer, will have no direct supervision of the construction process.

The function of either existing improvements, existing downstream conditions, on this site or prior improvements to other adjacent upstream or downstream properties may pose adverse effects downstream. The purpose of this development, as proposed, will not necessarily cure pre-existing off site adverse conditions.

We appreciate the opportunity to be of service to the City of Mountain Brook. If you have any questions or need any additional information, please give us a call at (205) 733-9696.

Sincerely,

InSite Engineering, LLC

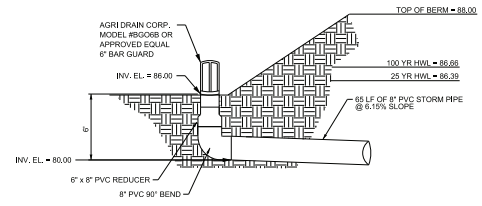
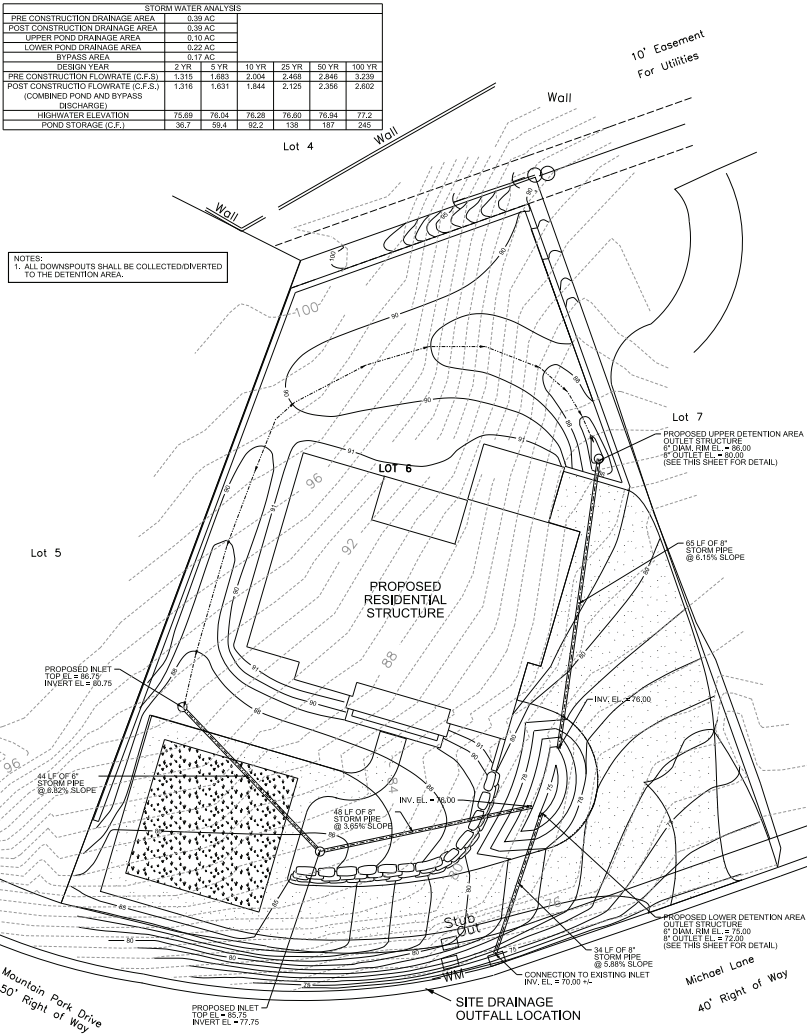
A handwritten signature in black ink, appearing to read "M. Golab", written over a white background.

Matt S. Golab, P.E.

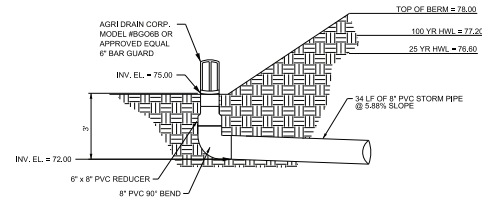
Copy: InSite File 21005.00/7.4



| STORM WATER ANALYSIS   |         |       |       |       |       |        |
|--|---------|-------|-------|-------|-------|--------|
| PRE CONSTRUCTION DRAINAGE AREA   | 0.39 AC |       |       |       |       |        |
| POST CONSTRUCTION DRAINAGE AREA  | 0.39 AC |       |       |       |       |        |
| UPPER POND DRAINAGE AREA   | 0.30 AC |       |       |       |       |        |
| LOWER POND DRAINAGE AREA   | 0.22 AC |       |       |       |       |        |
| BYPASS AREA  | 0.17 AC |       |       |       |       |        |
| DESIGN YEAR  | 2 YR    | 5 YR  | 10 YR | 25 YR | 50 YR | 100 YR |
| PRE CONSTRUCTION FLOWRATE (C.F.S.)                                       | 1.315   | 1.683 | 2.004 | 2.468 | 2.846 | 3.239  |
| POST CONSTRUCTION FLOWRATE (C.F.S.) (COMBINED POND AND BYPASS DISCHARGE) | 1.316   | 1.631 | 1.844 | 2.125 | 2.356 | 2.602  |
| HIGHWATER ELEVATION  | 75.69   | 76.04 | 76.20 | 76.60 | 76.94 | 77.2   |
| POND STORAGE (C.F.)  | 36.7    | 58.4  | 82.2  | 139   | 187   | 245    |



UPPER DETENTION AREA OUTLET STRUCTURE DETAIL  
N.T.S.



LOWER DETENTION AREA OUTLET STRUCTURE DETAIL  
N.T.S.



CONSTRUCTION PLANS FOR:  
**401 MICHAEL LANE  
DRAINAGE PLAN**  
MOUNTAIN BROOK, ALABAMA

**PROJECT INFO:**  
INSITE JOB NO. 21146.00  
PLOTTED: 12/06/21

12/06/21

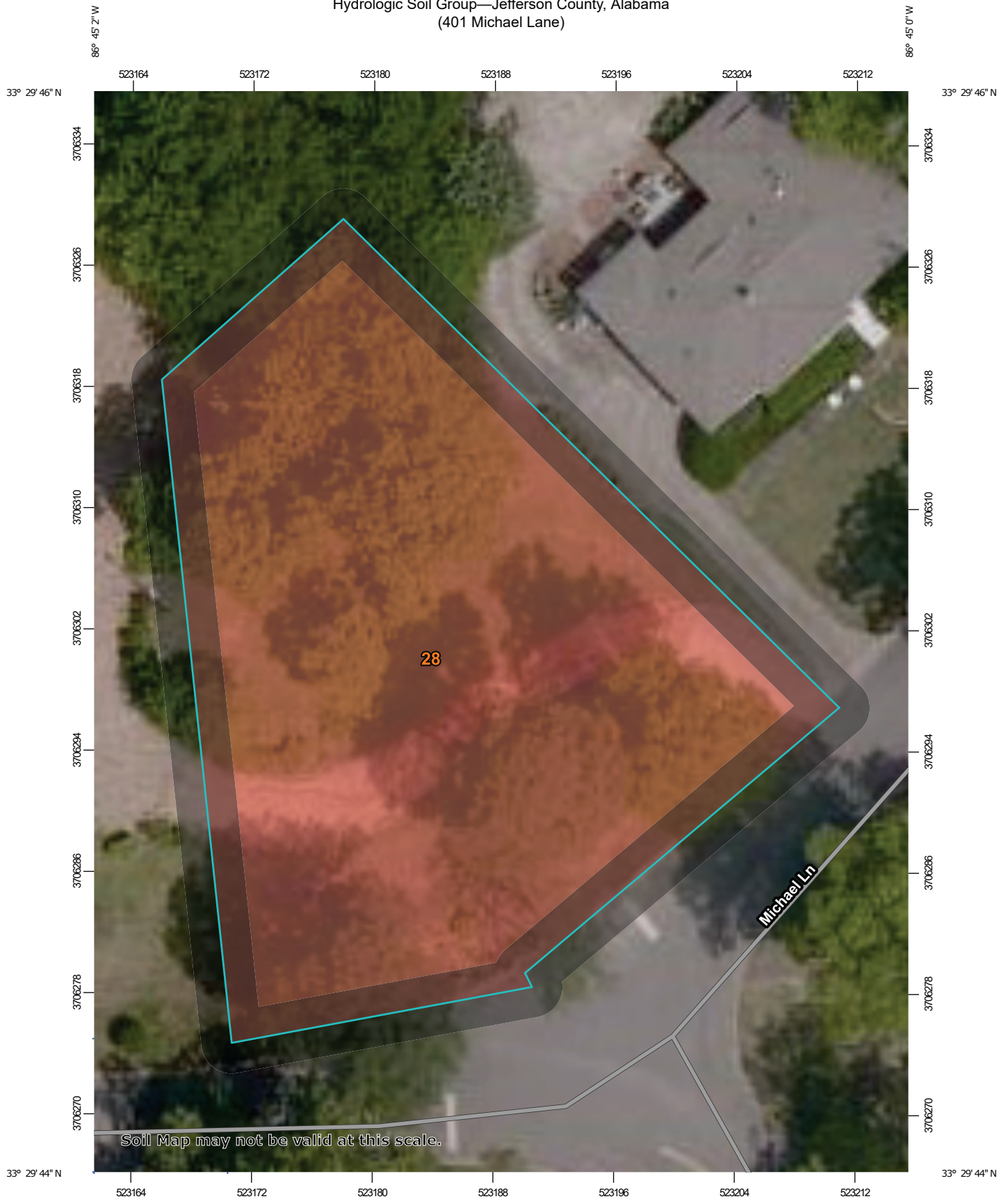
THIS SHEET CONTAINS:  
SITE DRAINAGE PLAN

SCALE: 1" = 10'  
SHEET 1 OF 1

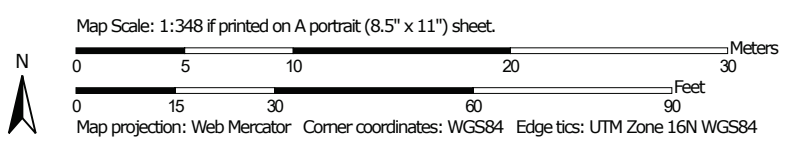
**DR-1**

12/06/21 10:58 AM  
 21146.00 DR-1.dwg  
 12/06/21 10:58 AM  
 21146.00 DR-1.dwg

Hydrologic Soil Group—Jefferson County, Alabama  
(401 Michael Lane)



































Soil Map may not be valid at this scale.



Hydrologic Soil Group—Jefferson County, Alabama  
(401 Michael Lane)

**MAP LEGEND**

|  |  |  |
|--|--|--|
| <b>Area of Interest (AOI)</b>  |  |  C                          |
|  Area of Interest (AOI)       |  |  C/D                        |
| <b>Soils</b>   |  |  D                          |
| <b>Soil Rating Polygons</b>  |  |  Not rated or not available |
|  A                            |  | <b>Water Features</b>  |
|  A/D                          |  |  Streams and Canals         |
|  B                            |  | <b>Transportation</b>  |
|  B/D                          |  |  Rails                      |
|  C                            |  |  Interstate Highways        |
|  C/D                          |  |  US Routes                  |
|  D                            |  |  Major Roads                |
|  Not rated or not available |  |  Local Roads              |
| <b>Soil Rating Lines</b>   |  | <b>Background</b>  |
|  A                          |  |  Aerial Photography       |
|  A/D                        |  |  |
|  B                          |  |  |
|  B/D                        |  |  |
|  C                          |  |  |
|  C/D                        |  |  |
|  D                          |  |  |
|  Not rated or not available |  |  |
| <b>Soil Rating Points</b>  |  |  |
|  A                          |  |  |
|  A/D                        |  |  |
|  B                          |  |  |
|  B/D                        |  |  |

**MAP INFORMATION**

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.  
Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL:  
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Jefferson County, Alabama  
Survey Area Data: Version 14, Sep 15, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 23, 2019—Jul 9, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.



## Hydrologic Soil Group

| Map unit symbol                    | Map unit name   | Rating | Acres in AOI | Percent of AOI |
|------------------------------------|---|--------|--------------|----------------|
| 28                                 | Montevallo-Nauvoo-Urban land complex, 10 to 40 percent slopes | D      | 0.4          | 100.0%         |
| <b>Totals for Area of Interest</b> |   |        | <b>0.4</b>   | <b>100.0%</b>  |

### Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

### Rating Options

*Aggregation Method:* Dominant Condition

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie. The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

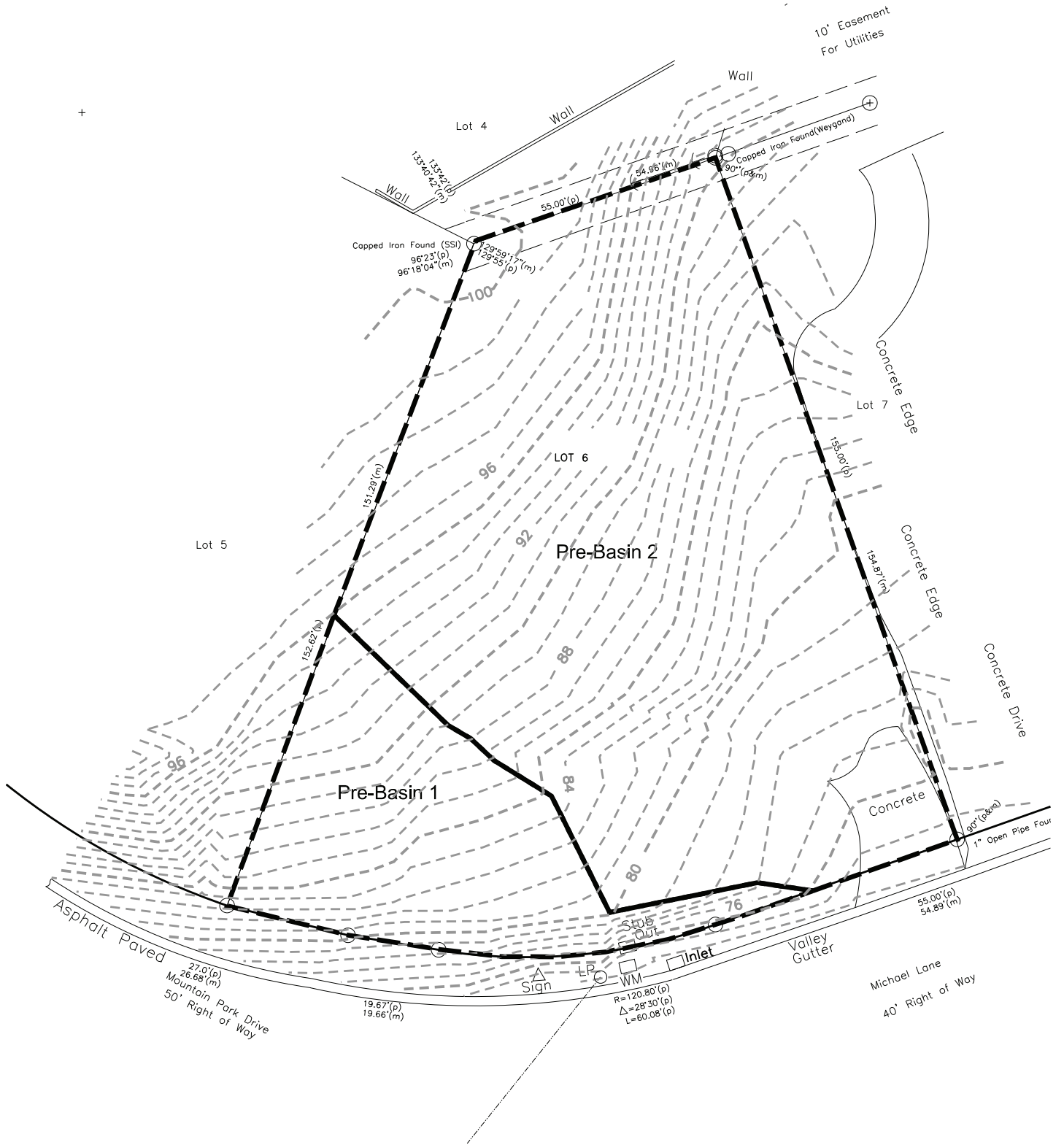
*Component Percent Cutoff: None Specified*

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

*Tie-break Rule: Higher*

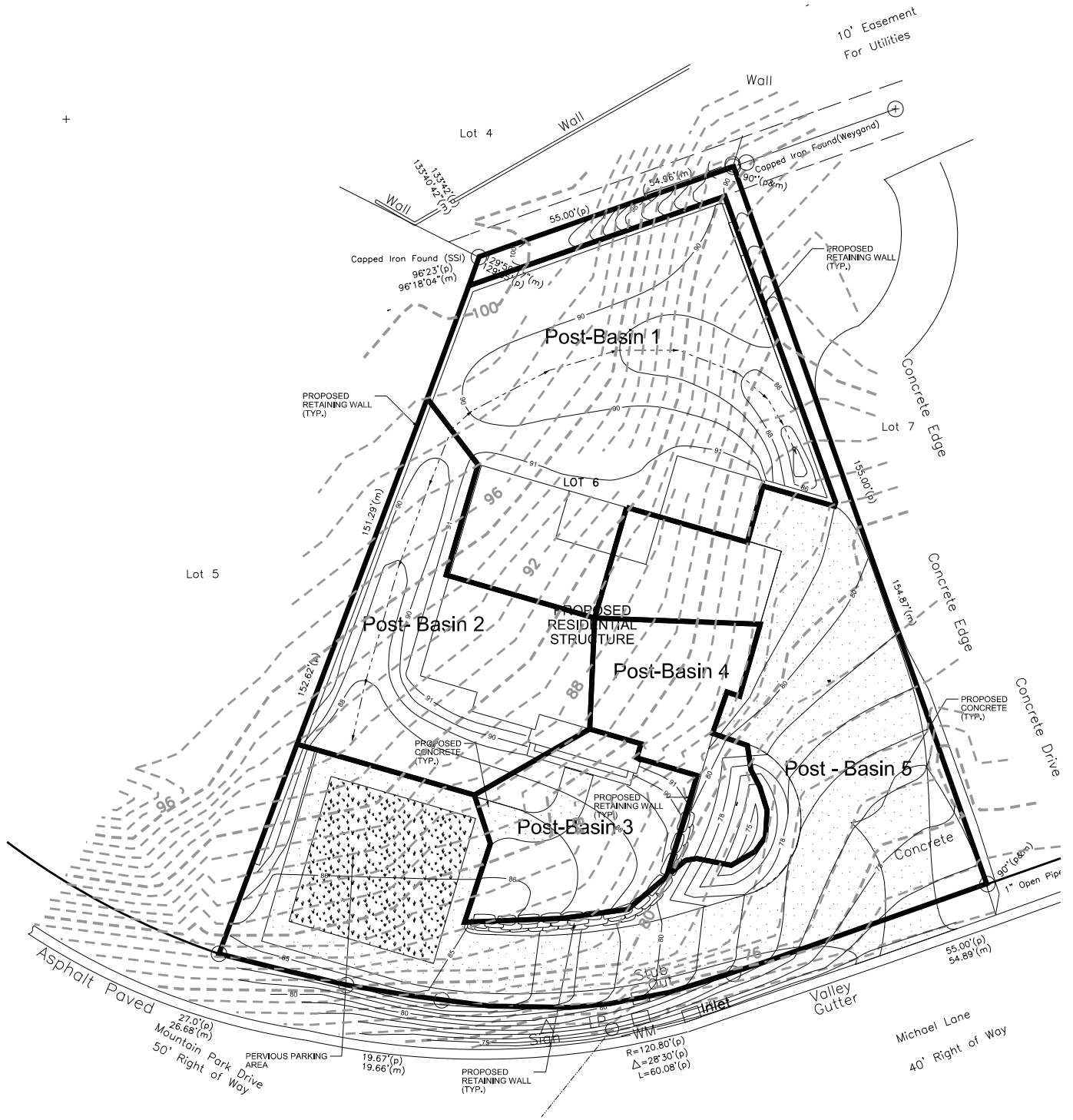
The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

# Pre-Development Basins





# Post-Development Basins



# 401 Michael Lane Tc Calculations

## PRE BASINS

| Description            | 2-year RF |    |               | SCF |        |                 | SCF |        |                  | SCF |        |                  | DF-2 |          | DF-2              |          | Tc, hr | Tc, min | Lag, hrs |      |      |      |      |      |
|------------------------|-----------|----|---------------|-----|--------|-----------------|-----|--------|------------------|-----|--------|------------------|------|----------|-------------------|----------|--------|---------|----------|------|------|------|------|------|
|                        | n         | Lf | S, B/R T, hrs | Lf  | S, B/R | k V T, hrs      | Lf  | S, B/R | k V T, hrs       | Lf  | S, B/R | k V T, hrs       | Lf   | V T, hrs | Lf                | V T, hrs |        |         |          |      |      |      |      |      |
| Pre Basin 1 to Outfall | 0.13      | 24 | 0.199 0.02    | 50  | 0.20   | 10.07 4.49 0.00 | 9   | 0.52   | 10.07 7.27 0.00  | 0   | 0.00   | 4.9869 0.30 0.00 | 0    | 0.01     | 14.9930 1.78 0.00 | 0        | 2.00   | 0.00    | 0        | 5.00 | 0.00 | 0.02 | 1.19 | 0.01 |
| Pre Basin 2 to Outfall | 0.40      | 22 | 0.09 0.05     | 29  | 0.44   | 10.07 6.70 0.00 | 142 | 0.11   | 14.993 4.95 0.01 | 0   | 0.00   | 4.9869 0.30 0.00 | 0    | 0.01     | 14.9930 1.78 0.00 | 0        | 2.00   | 0.00    | 0        | 5.00 | 0.00 | 0.06 | 3.67 | 0.04 |

SF Table

|       |                      |
|-------|----------------------|
| 0.011 | Smooth Surface       |
| 0.05  | Fallow (no residue)  |
|       | Cultivated           |
| 0.06  | Residue Cover < 20%  |
| 0.17  | Residue Cover >20%   |
|       | Grass                |
| 0.15  | Short grass, prairie |
| 0.24  | Dense grasses        |
| 0.41  | Bermudagrass         |
| 0.13  | Range (pasture)      |
|       | Woods                |
| 0.4   | Light underbrush     |
| 0.8   | Dense underbrush     |

## POST BASINS

| Description               | 2-year RF |    |               | SCF |        |                  | SCF |        |                  | SCF |        |                   | DF-2 |          | DF-2              |          | Tc, hr | Tc, min | Lag, hrs |      |      |      |      |      |
|---------------------------|-----------|----|---------------|-----|--------|------------------|-----|--------|------------------|-----|--------|-------------------|------|----------|-------------------|----------|--------|---------|----------|------|------|------|------|------|
|                           | n         | Lf | S, B/R T, hrs | Lf  | S, B/R | k V T, hrs       | Lf  | S, B/R | k V T, hrs       | Lf  | S, B/R | k V T, hrs        | Lf   | V T, hrs | Lf                | V T, hrs |        |         |          |      |      |      |      |      |
| Post Basin 1 to Detention | 0.01      | 31 | 0.2 0.00      | 23  | 0.01   | 20.308 2.03 0.00 | 16  | 0.08   | 14.993 4.11 0.00 | 81  | 0.02   | 14.9930 2.35 0.01 | 0    | 0.01     | 14.9930 1.78 0.00 | 0        | 2.00   | 0.00    | 0        | 5.00 | 0.00 | 0.02 | 0.99 | 0.01 |
| Post Basin 2 to Detention | 0.24      | 13 | 0.04 0.03     | 60  | 0.05   | 14.993 3.45 0.00 | 0   | 0.08   | 14.993 4.11 0.00 | 0   | 0.02   | 14.9930 2.35 0.00 | 0    | 0.01     | 14.9930 1.78 0.00 | 0        | 2.00   | 0.00    | 0        | 5.00 | 0.00 | 0.04 | 2.11 | 0.02 |
| Post Basin 3 to Detention | 0.24      | 18 | 0.119 0.03    | 30  | 0.12   | 14.993 5.17 0.00 | 0   | 0.08   | 14.993 4.11 0.00 | 0   | 0.02   | 14.9930 2.35 0.00 | 0    | 0.01     | 14.9930 1.78 0.00 | 0        | 2.00   | 0.00    | 0        | 5.00 | 0.00 | 0.03 | 1.66 | 0.02 |
| Post Basin 4 to Detention | 0.01      | 31 | 0.2 0.00      | 23  | 0.01   | 20.308 2.03 0.00 | 10  | 0.33   | 14.993 8.61 0.00 | 0   | 0.02   | 14.9930 2.35 0.00 | 0    | 0.01     | 14.9930 1.78 0.00 | 0        | 2.00   | 0.00    | 0        | 5.00 | 0.00 | 0.01 | 0.38 | 0.00 |
| Post Basin 5 to Outfall   | 0.24      | 22 | 0.096 0.04    | 111 | 0.17   | 14.993 6.12 0.01 | 83  | 0.09   | 20.308 6.11 0.00 | 0   | 0.02   | 14.9930 2.35 0.00 | 0    | 0.01     | 14.9930 1.78 0.00 | 0        | 2.00   | 0.00    | 0        | 5.00 | 0.00 | 0.05 | 2.85 | 0.03 |

SCF Table

|        |                               |
|--------|-------------------------------|
| k      | Description                   |
| 2.6934 | Forest w/ heavy ground litter |
| 4.9869 | Woodland                      |
| 6.9882 | Short grass pasture           |
| 8.9895 | Cultivated short row          |
| 10.007 | Nearly bare & unilled         |
| 14.993 | Grassland                     |
| 16.105 | Unpaved                       |
| 20.308 | Paved                         |

## Hydrograph Return Period Recap ..... 1

### 2 - Year

#### Summary Report ..... 2

#### Hydrograph Reports ..... 3

Hydrograph No. 1, SCS Runoff, Pre-Development Basin 1 ..... 3

Hydrograph No. 2, SCS Runoff, Pre-Development Basin 2 ..... 4

Hydrograph No. 3, Combine, Total Pre-Development Flow to Outfall ..... 5

Hydrograph No. 5, SCS Runoff, Post-Development Basin 1 ..... 6

Hydrograph No. 6, Reservoir, Upper Detention ..... 7

Pond Report - 401 Upper Detention ..... 8

Hydrograph No. 7, SCS Runoff, Post-Development Basin 2 ..... 9

Hydrograph No. 8, SCS Runoff, Post-Development Basin 3 ..... 10

Hydrograph No. 9, SCS Runoff, Pre-Development Basin 4 ..... 11

Hydrograph No. 10, Combine, Total Flow to Lower Detention ..... 12

Hydrograph No. 11, Reservoir, 401 Michael Performanc ..... 13

Pond Report - 401 Michael Detention ..... 14

Hydrograph No. 12, SCS Runoff, Post-Development Basin 5 ..... 15

Hydrograph No. 13, Combine, Total flow undetained ..... 16

Hydrograph No. 14, Combine, Total Post Flow to Outfall ..... 17

### 5 - Year

#### Summary Report ..... 18

#### Hydrograph Reports ..... 19

Hydrograph No. 1, SCS Runoff, Pre-Development Basin 1 ..... 19

Hydrograph No. 2, SCS Runoff, Pre-Development Basin 2 ..... 20

Hydrograph No. 3, Combine, Total Pre-Development Flow to Outfall ..... 21

Hydrograph No. 5, SCS Runoff, Post-Development Basin 1 ..... 22

Hydrograph No. 6, Reservoir, Upper Detention ..... 23

Hydrograph No. 7, SCS Runoff, Post-Development Basin 2 ..... 24

Hydrograph No. 8, SCS Runoff, Post-Development Basin 3 ..... 25

Hydrograph No. 9, SCS Runoff, Pre-Development Basin 4 ..... 26

Hydrograph No. 10, Combine, Total Flow to Lower Detention ..... 27

Hydrograph No. 11, Reservoir, 401 Michael Performanc ..... 28

Hydrograph No. 12, SCS Runoff, Post-Development Basin 5 ..... 29

Hydrograph No. 13, Combine, Total flow undetained ..... 30

Hydrograph No. 14, Combine, Total Post Flow to Outfall ..... 31

### 10 - Year

#### Summary Report ..... 32

#### Hydrograph Reports ..... 33

Hydrograph No. 1, SCS Runoff, Pre-Development Basin 1 ..... 33

Hydrograph No. 2, SCS Runoff, Pre-Development Basin 2 ..... 34

Hydrograph No. 3, Combine, Total Pre-Development Flow to Outfall ..... 35

Hydrograph No. 5, SCS Runoff, Post-Development Basin 1 ..... 36

Hydrograph No. 6, Reservoir, Upper Detention ..... 37

Hydrograph No. 7, SCS Runoff, Post-Development Basin 2 ..... 38

Hydrograph No. 8, SCS Runoff, Post-Development Basin 3 ..... 39

Hydrograph No. 9, SCS Runoff, Pre-Development Basin 4 ..... 40



|   |    |
|---|----|
| Hydrograph No. 10, Combine, Total Flow to Lower Detention ..... | 41 |
| Hydrograph No. 11, Reservoir, 401 Michael Performanc .....      | 42 |
| Hydrograph No. 12, SCS Runoff, Post-Development Basin 5 .....   | 43 |
| Hydrograph No. 13, Combine, Total flow undetained .....         | 44 |
| Hydrograph No. 14, Combine, Total Post Flow to Outfall .....    | 45 |

**25 - Year**

|  |           |
|--|-----------|
| <b>Summary Report .....</b>  | <b>46</b> |
| <b>Hydrograph Reports .....</b>  | <b>47</b> |
| Hydrograph No. 1, SCS Runoff, Pre-Development Basin 1 .....            | 47        |
| Hydrograph No. 2, SCS Runoff, Pre-Development Basin 2 .....            | 48        |
| Hydrograph No. 3, Combine, Total Pre-Development Flow to Outfall ..... | 49        |
| Hydrograph No. 5, SCS Runoff, Post-Development Basin 1 .....           | 50        |
| Hydrograph No. 6, Reservoir, Upper Detention .....                     | 51        |
| Hydrograph No. 7, SCS Runoff, Post-Development Basin 2 .....           | 52        |
| Hydrograph No. 8, SCS Runoff, Post-Development Basin 3 .....           | 53        |
| Hydrograph No. 9, SCS Runoff, Pre-Development Basin 4 .....            | 54        |
| Hydrograph No. 10, Combine, Total Flow to Lower Detention .....        | 55        |
| Hydrograph No. 11, Reservoir, 401 Michael Performanc .....             | 56        |
| Hydrograph No. 12, SCS Runoff, Post-Development Basin 5 .....          | 57        |
| Hydrograph No. 13, Combine, Total flow undetained .....                | 58        |
| Hydrograph No. 14, Combine, Total Post Flow to Outfall .....           | 59        |

**50 - Year**

|  |           |
|--|-----------|
| <b>Summary Report .....</b>  | <b>60</b> |
| <b>Hydrograph Reports .....</b>  | <b>61</b> |
| Hydrograph No. 1, SCS Runoff, Pre-Development Basin 1 .....            | 61        |
| Hydrograph No. 2, SCS Runoff, Pre-Development Basin 2 .....            | 62        |
| Hydrograph No. 3, Combine, Total Pre-Development Flow to Outfall ..... | 63        |
| Hydrograph No. 5, SCS Runoff, Post-Development Basin 1 .....           | 64        |
| Hydrograph No. 6, Reservoir, Upper Detention .....                     | 65        |
| Hydrograph No. 7, SCS Runoff, Post-Development Basin 2 .....           | 66        |
| Hydrograph No. 8, SCS Runoff, Post-Development Basin 3 .....           | 67        |
| Hydrograph No. 9, SCS Runoff, Pre-Development Basin 4 .....            | 68        |
| Hydrograph No. 10, Combine, Total Flow to Lower Detention .....        | 69        |
| Hydrograph No. 11, Reservoir, 401 Michael Performanc .....             | 70        |
| Hydrograph No. 12, SCS Runoff, Post-Development Basin 5 .....          | 71        |
| Hydrograph No. 13, Combine, Total flow undetained .....                | 72        |
| Hydrograph No. 14, Combine, Total Post Flow to Outfall .....           | 73        |

**100 - Year**

|  |           |
|--|-----------|
| <b>Summary Report .....</b>  | <b>74</b> |
| <b>Hydrograph Reports .....</b>  | <b>75</b> |
| Hydrograph No. 1, SCS Runoff, Pre-Development Basin 1 .....            | 75        |
| Hydrograph No. 2, SCS Runoff, Pre-Development Basin 2 .....            | 76        |
| Hydrograph No. 3, Combine, Total Pre-Development Flow to Outfall ..... | 77        |
| Hydrograph No. 5, SCS Runoff, Post-Development Basin 1 .....           | 78        |
| Hydrograph No. 6, Reservoir, Upper Detention .....                     | 79        |
| Hydrograph No. 7, SCS Runoff, Post-Development Basin 2 .....           | 80        |
| Hydrograph No. 8, SCS Runoff, Post-Development Basin 3 .....           | 81        |
| Hydrograph No. 9, SCS Runoff, Pre-Development Basin 4 .....            | 82        |

---

|   |    |
|---|----|
| Hydrograph No. 10, Combine, Total Flow to Lower Detention ..... | 83 |
| Hydrograph No. 11, Reservoir, 401 Michael Performanc .....      | 84 |
| Hydrograph No. 12, SCS Runoff, Post-Development Basin 5 .....   | 85 |
| Hydrograph No. 13, Combine, Total flow undetained .....         | 86 |
| Hydrograph No. 14, Combine, Total Post Flow to Outfall .....    | 87 |

# Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.1

| Hyd. No. | Hydrograph type (origin) | Inflow Hyd(s)  | Peak Outflow (cfs) |       |       |       |       |       |       |        | Hydrograph description                |
|----------|--------------------------|----------------|--------------------|-------|-------|-------|-------|-------|-------|--------|---------------------------------------|
|          |                          |                | 1-Yr               | 2-Yr  | 3-Yr  | 5-Yr  | 10-Yr | 25-Yr | 50-Yr | 100-Yr |                                       |
| 1        | SCS Runoff               | -----          | -----              | 0.277 | ----- | 0.362 | 0.436 | 0.544 | 0.633 | 0.725  | Pre-Development Basin 1               |
| 2        | SCS Runoff               | -----          | -----              | 1.049 | ----- | 1.336 | 1.586 | 1.948 | 2.242 | 2.548  | Pre-Development Basin 2               |
| 3        | Combine                  | 1, 2           | -----              | 1.315 | ----- | 1.683 | 2.004 | 2.468 | 2.846 | 3.239  | Total Pre-Development Flow to Outfall |
| 5        | SCS Runoff               | -----          | -----              | 0.307 | ----- | 0.402 | 0.484 | 0.605 | 0.703 | 0.805  | Post-Development Basin 1              |
| 6        | Reservoir                | 5              | -----              | 0.301 | ----- | 0.393 | 0.467 | 0.516 | 0.595 | 0.671  | Upper Detention                       |
| 7        | SCS Runoff               | -----          | -----              | 0.209 | ----- | 0.266 | 0.316 | 0.387 | 0.446 | 0.506  | Post-Development Basin 2              |
| 8        | SCS Runoff               | -----          | -----              | 0.104 | ----- | 0.133 | 0.158 | 0.194 | 0.223 | 0.253  | Post-Development Basin 3              |
| 9        | SCS Runoff               | -----          | -----              | 0.121 | ----- | 0.148 | 0.173 | 0.208 | 0.236 | 0.266  | Pre-Development Basin 4               |
| 10       | Combine                  | 6, 7, 8, 9     | -----              | 0.731 | ----- | 0.937 | 1.113 | 1.254 | 1.448 | 1.639  | Total Flow to Lower Detention         |
| 11       | Reservoir                | 10             | -----              | 0.683 | ----- | 0.844 | 0.933 | 1.045 | 1.153 | 1.225  | 401 Michael Performanc                |
| 12       | SCS Runoff               | -----          | -----              | 0.670 | ----- | 0.829 | 0.967 | 1.166 | 1.327 | 1.496  | Post-Development Basin 5              |
| 13       | Combine                  | 5, 7, 8, 9, 12 | -----              | 1.411 | ----- | 1.778 | 2.097 | 2.559 | 2.935 | 3.326  | Total flow undetained                 |
| 14       | Combine                  | 11, 12,        | -----              | 1.316 | ----- | 1.631 | 1.844 | 2.125 | 2.356 | 2.602  | Total Post Flow to Outfall            |



# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

| Hyd. No.             | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Hyd. volume (cuft)    | Inflow hyd(s)  | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph description                |
|----------------------|--------------------------|-----------------|---------------------|--------------------|-----------------------|----------------|------------------------|-------------------------|---------------------------------------|
| 1                    | SCS Runoff               | 0.277           | 1                   | 722                | 753                   | ---            | -----                  | -----                   | Pre-Development Basin 1               |
| 2                    | SCS Runoff               | 1.049           | 1                   | 723                | 3,073                 | ---            | -----                  | -----                   | Pre-Development Basin 2               |
| 3                    | Combine                  | 1.315           | 1                   | 723                | 3,826                 | 1, 2           | -----                  | -----                   | Total Pre-Development Flow to Outfall |
| 5                    | SCS Runoff               | 0.307           | 1                   | 722                | 837                   | ---            | -----                  | -----                   | Post-Development Basin 1              |
| 6                    | Reservoir                | 0.301           | 1                   | 723                | 837                   | 5              | 86.15                  | 18.1                    | Upper Detention                       |
| 7                    | SCS Runoff               | 0.209           | 1                   | 722                | 576                   | ---            | -----                  | -----                   | Post-Development Basin 2              |
| 8                    | SCS Runoff               | 0.104           | 1                   | 722                | 288                   | ---            | -----                  | -----                   | Post-Development Basin 3              |
| 9                    | SCS Runoff               | 0.121           | 1                   | 722                | 349                   | ---            | -----                  | -----                   | Pre-Development Basin 4               |
| 10                   | Combine                  | 0.731           | 1                   | 722                | 2,051                 | 6, 7, 8, 9     | -----                  | -----                   | Total Flow to Lower Detention         |
| 11                   | Reservoir                | 0.683           | 1                   | 724                | 2,051                 | 10             | 75.69                  | 36.7                    | 401 Michael Performanc                |
| 12                   | SCS Runoff               | 0.670           | 1                   | 722                | 1,919                 | ---            | -----                  | -----                   | Post-Development Basin 5              |
| 13                   | Combine                  | 1.411           | 1                   | 722                | 3,970                 | 5, 7, 8, 9, 12 | -----                  | -----                   | Total flow undetained                 |
| 14                   | Combine                  | 1.316           | 1                   | 723                | 3,970                 | 11, 12,        | -----                  | -----                   | Total Post Flow to Outfall            |
| 401MichaelBasins.gpw |                          |                 |                     |                    | Return Period: 2 Year |                |                        | Monday, Dec 6, 2021     |                                       |

# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

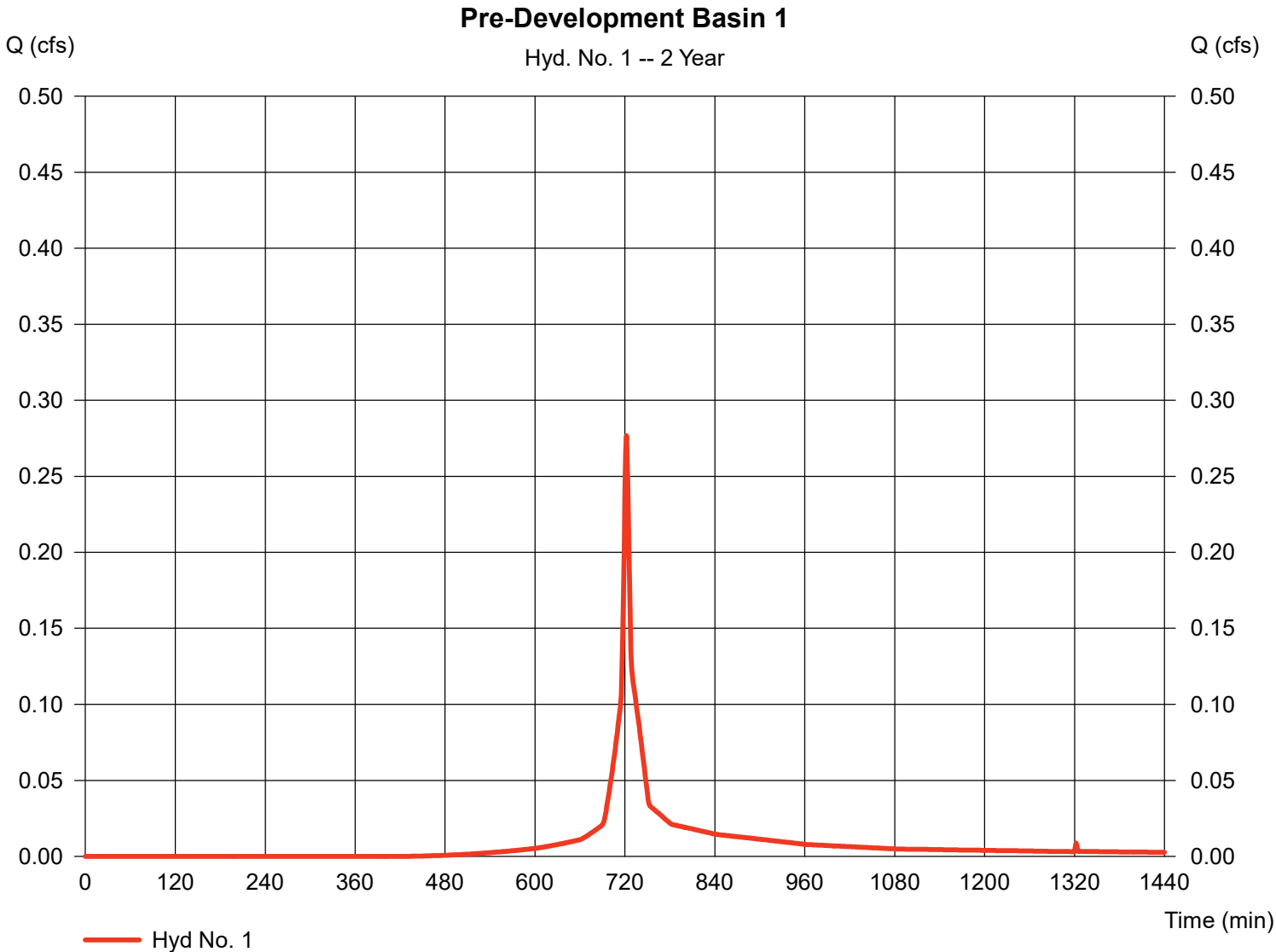
## Hyd. No. 1

### Pre-Development Basin 1

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Time interval = 1 min  
Drainage area = 0.090 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.10 in  
Storm duration = 24 hrs

Peak discharge = 0.277 cfs  
Time to peak = 722 min  
Hyd. volume = 753 cuft  
Curve number = 84\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) = [(0.020 x 85) + (0.070 x 84)] / 0.090



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

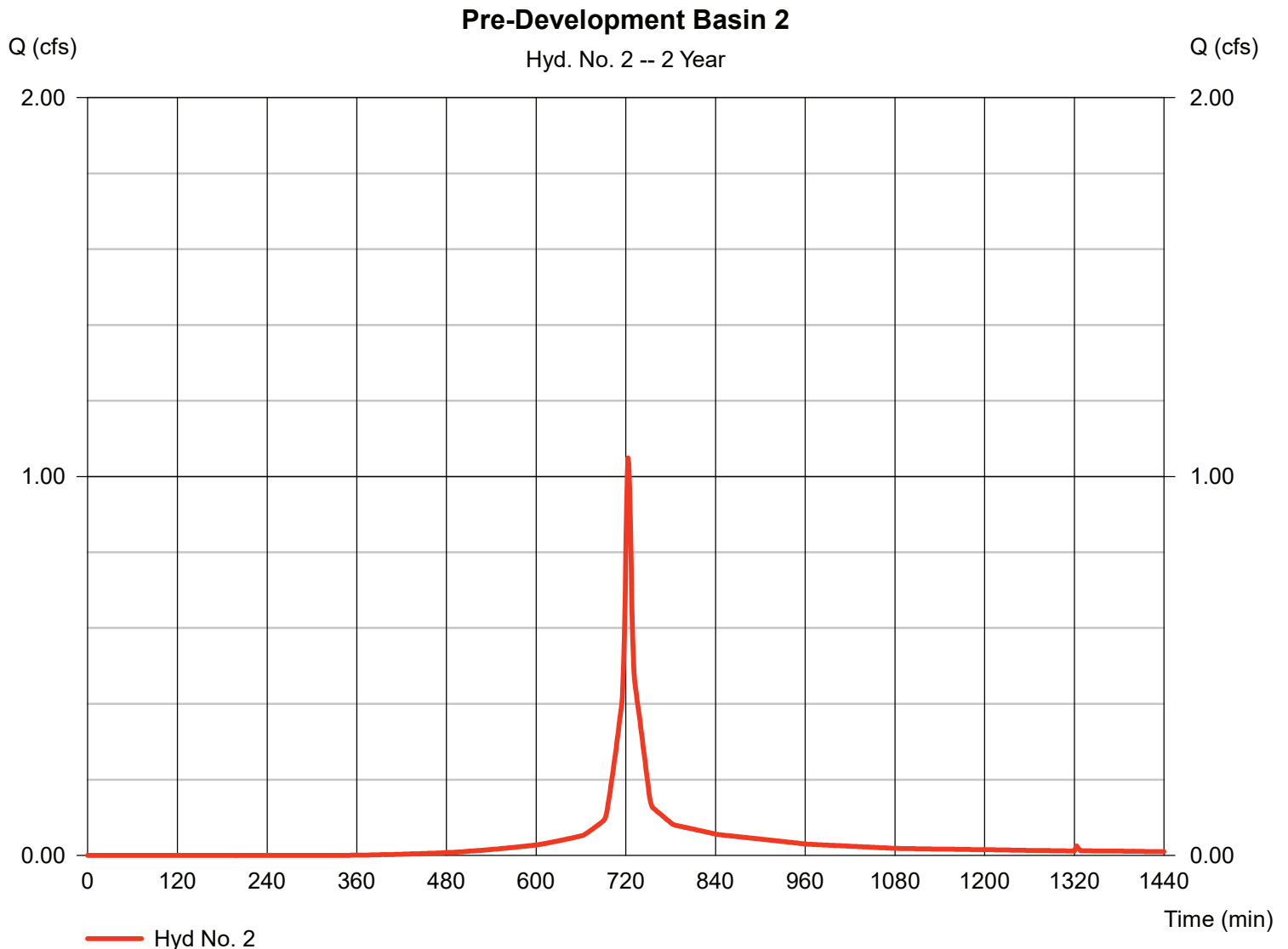
## Hyd. No. 2

### Pre-Development Basin 2

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Time interval = 1 min  
Drainage area = 0.300 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.10 in  
Storm duration = 24 hrs

Peak discharge = 1.049 cfs  
Time to peak = 723 min  
Hyd. volume = 3,073 cuft  
Curve number = 88\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 3.70 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.054 \times 83) + (0.123 \times 86) + (0.057 \times 98) + (0.064 \times 85)] / 0.300$





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

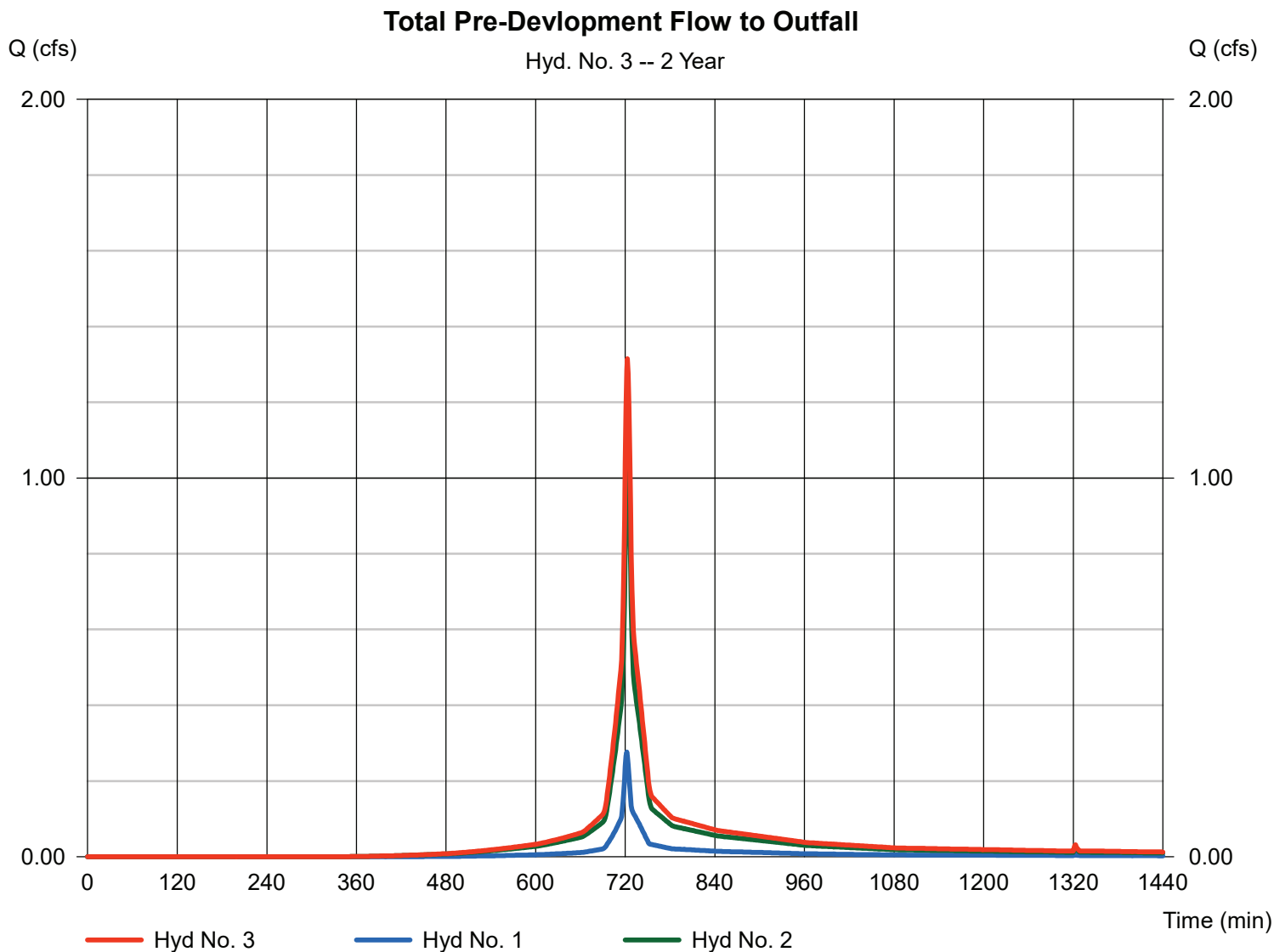
Monday, Dec 6, 2021

## Hyd. No. 3

Total Pre-Development Flow to Outfall

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Time interval = 1 min  
Inflow hyds. = 1, 2

Peak discharge = 1.315 cfs  
Time to peak = 723 min  
Hyd. volume = 3,826 cuft  
Contrib. drain. area = 0.390 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

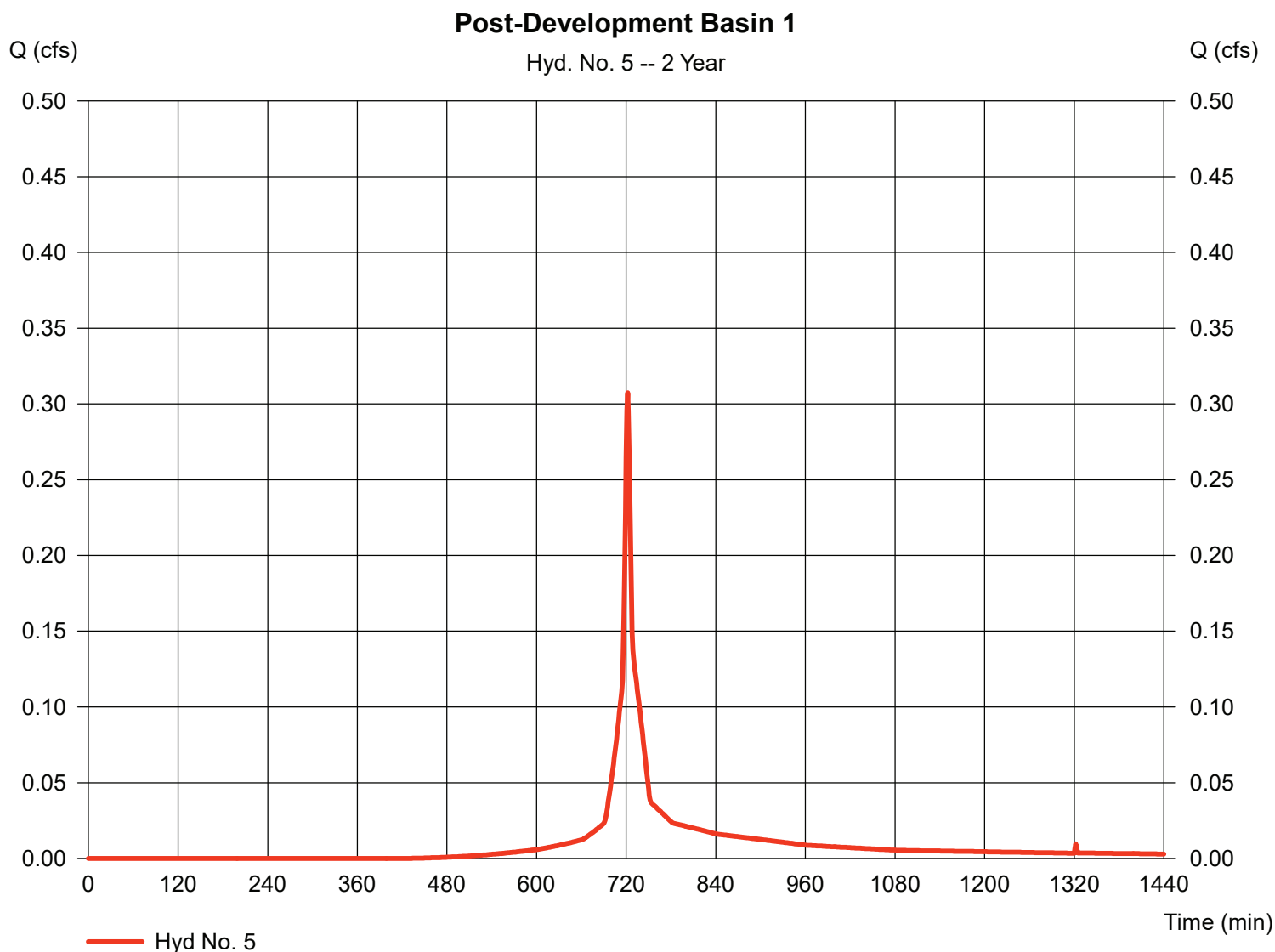
## Hyd. No. 5

### Post-Development Basin 1

Hydrograph type = SCS Runoff  
 Storm frequency = 2 yrs  
 Time interval = 1 min  
 Drainage area = 0.100 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 4.10 in  
 Storm duration = 24 hrs

Peak discharge = 0.307 cfs  
 Time to peak = 722 min  
 Hyd. volume = 837 cuft  
 Curve number = 84\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 2.00 min  
 Distribution = Type III  
 Shape factor = 484

\* Composite (Area/CN) =  $[(0.020 \times 98) + (0.020 \times 83) + (0.060 \times 80)] / 0.100$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

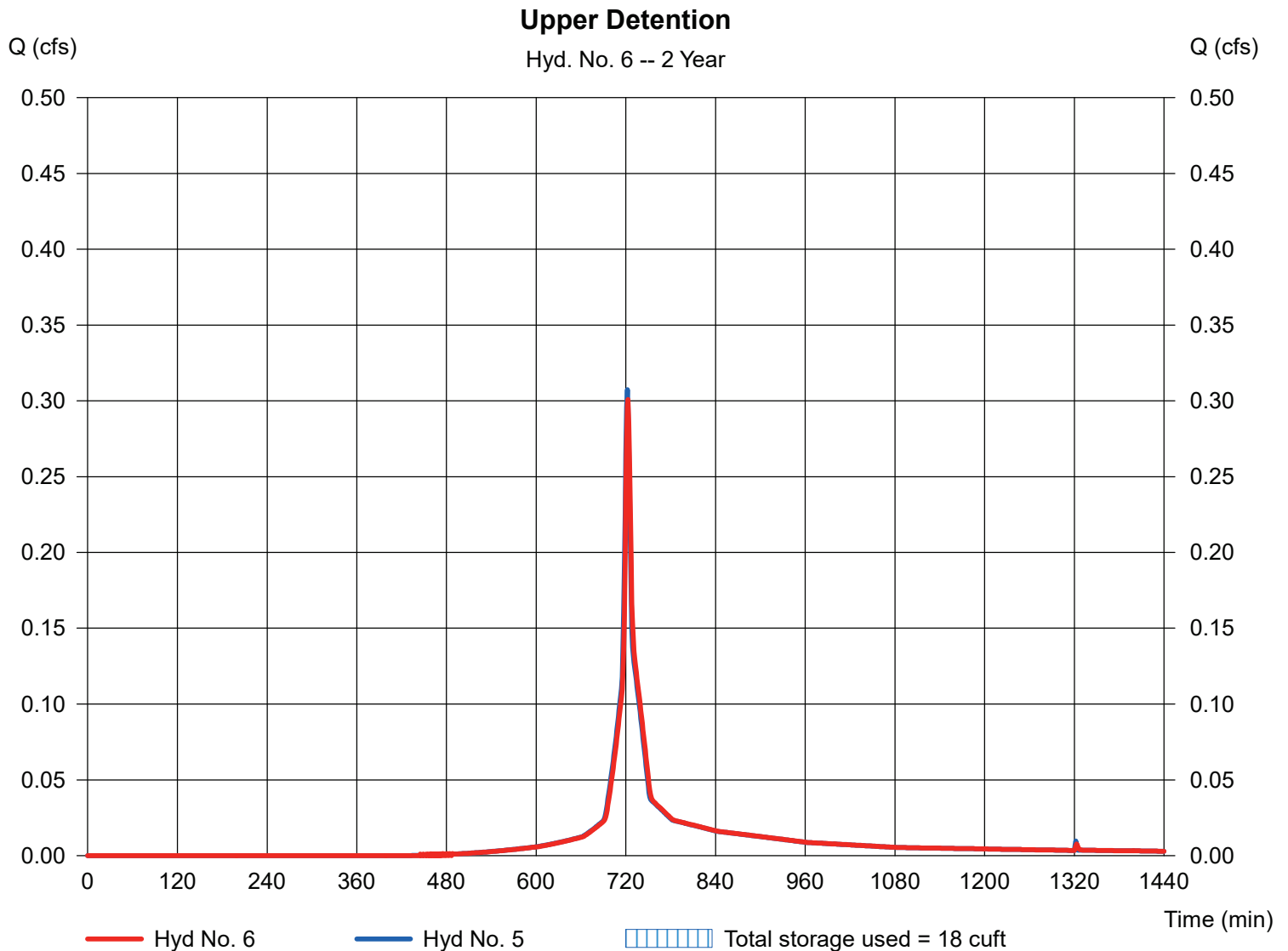
## Hyd. No. 6

Upper Detention

Hydrograph type = Reservoir  
 Storm frequency = 2 yrs  
 Time interval = 1 min  
 Inflow hyd. No. = 5 - Post-Development Basin 1  
 Reservoir name = 401 Upper Detention

Peak discharge = 0.301 cfs  
 Time to peak = 723 min  
 Hyd. volume = 837 cuft  
 Max. Elevation = 86.15 ft  
 Max. Storage = 18 cuft

Storage Indication method used.







# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

## Hyd. No. 7

### Post-Development Basin 2

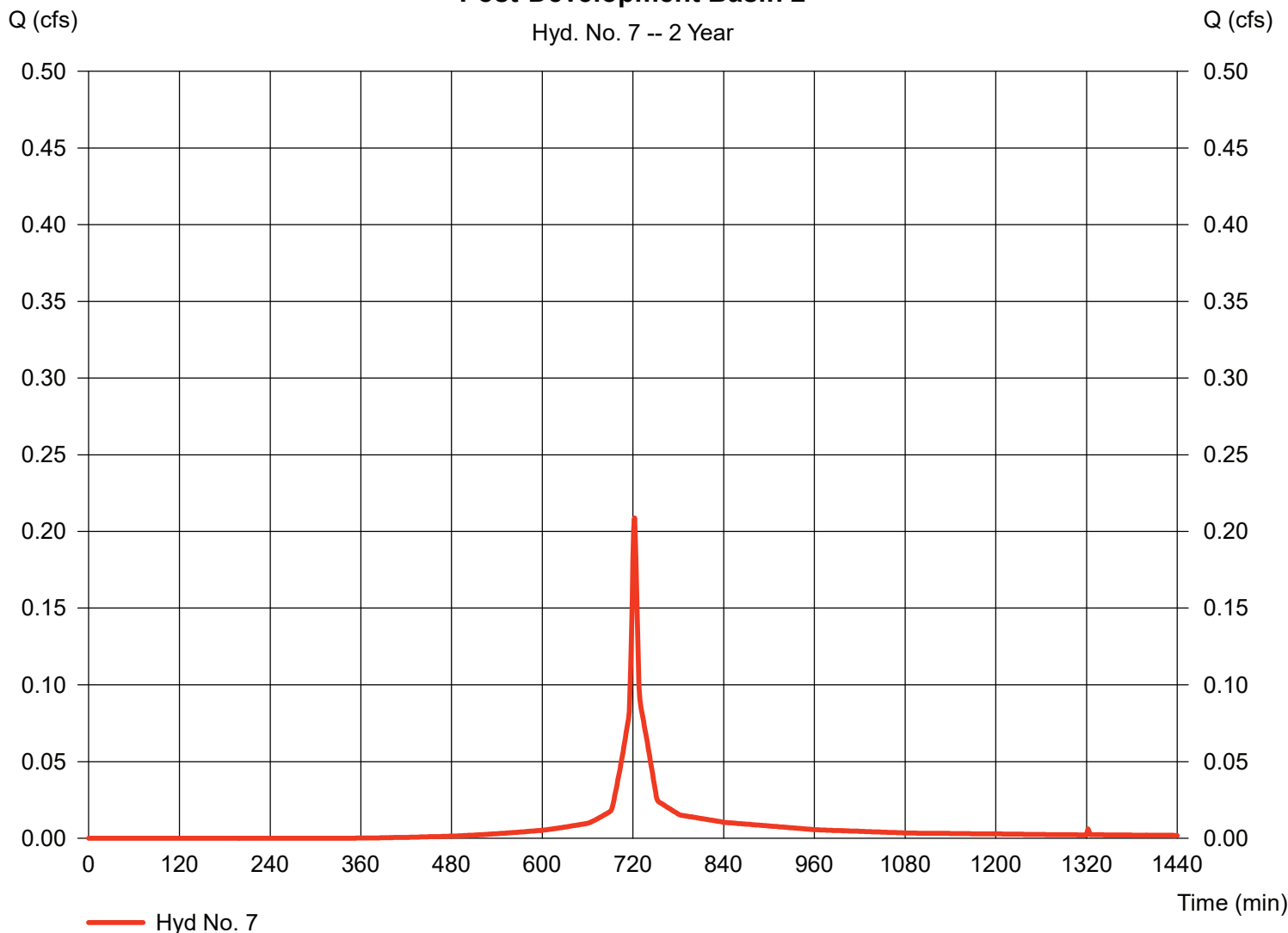
Hydrograph type = SCS Runoff  
 Storm frequency = 2 yrs  
 Time interval = 1 min  
 Drainage area = 0.060 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 4.10 in  
 Storm duration = 24 hrs

Peak discharge = 0.209 cfs  
 Time to peak = 722 min  
 Hyd. volume = 576 cuft  
 Curve number = 88\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 2.11 min  
 Distribution = Type III  
 Shape factor = 484

\* Composite (Area/CN) =  $[(0.037 \times 83) + (0.020 \times 98)] / 0.060$

### Post-Development Basin 2

Hyd. No. 7 -- 2 Year



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

## Hyd. No. 8

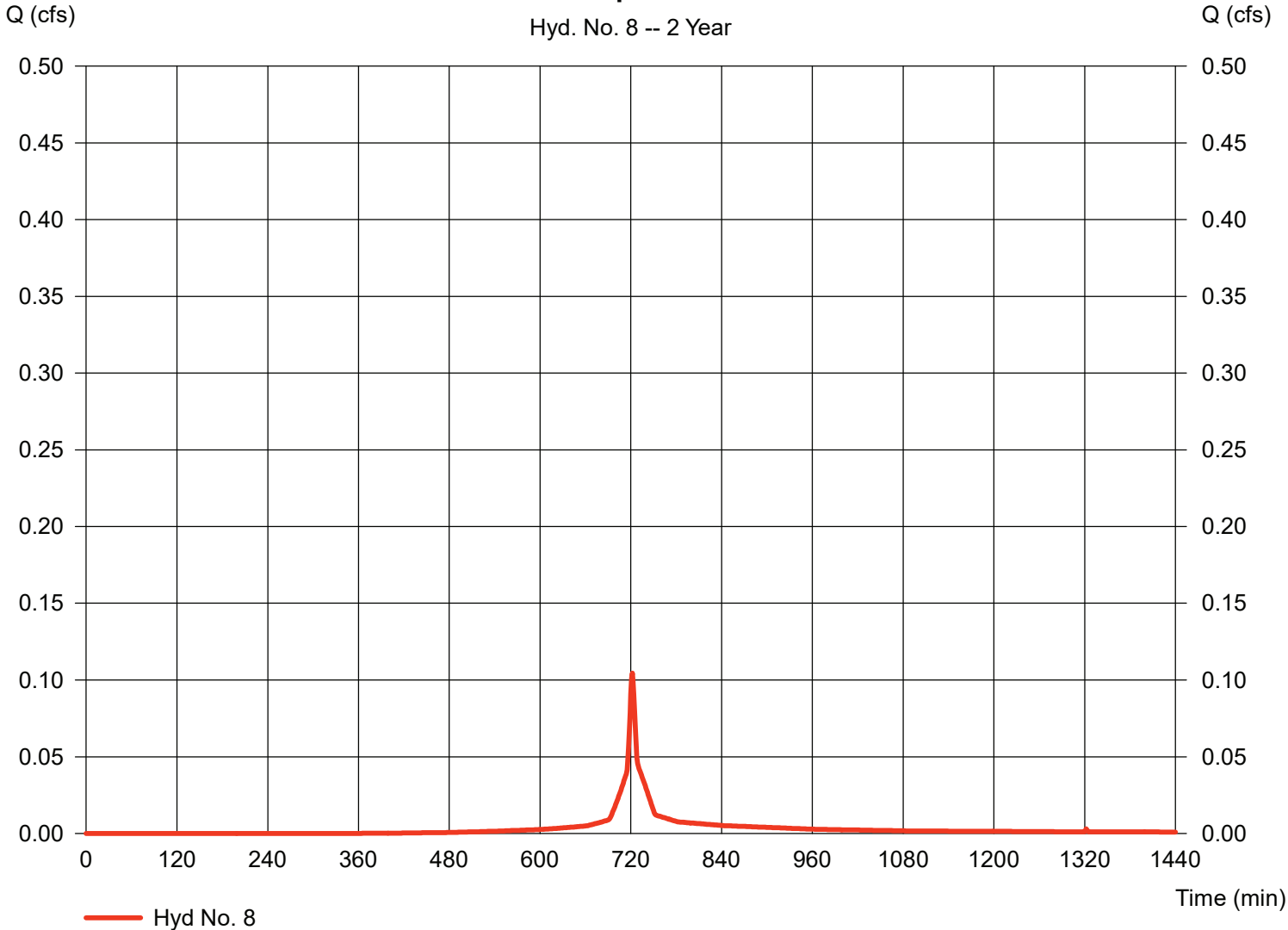
### Post-Development Basin 3

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Time interval = 1 min  
Drainage area = 0.030 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.10 in  
Storm duration = 24 hrs

Peak discharge = 0.104 cfs  
Time to peak = 722 min  
Hyd. volume = 288 cuft  
Curve number = 88\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.007 \times 98) + (0.023 \times 85)] / 0.030$

### Post-Development Basin 3



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

## Hyd. No. 9

### Pre-Development Basin 4

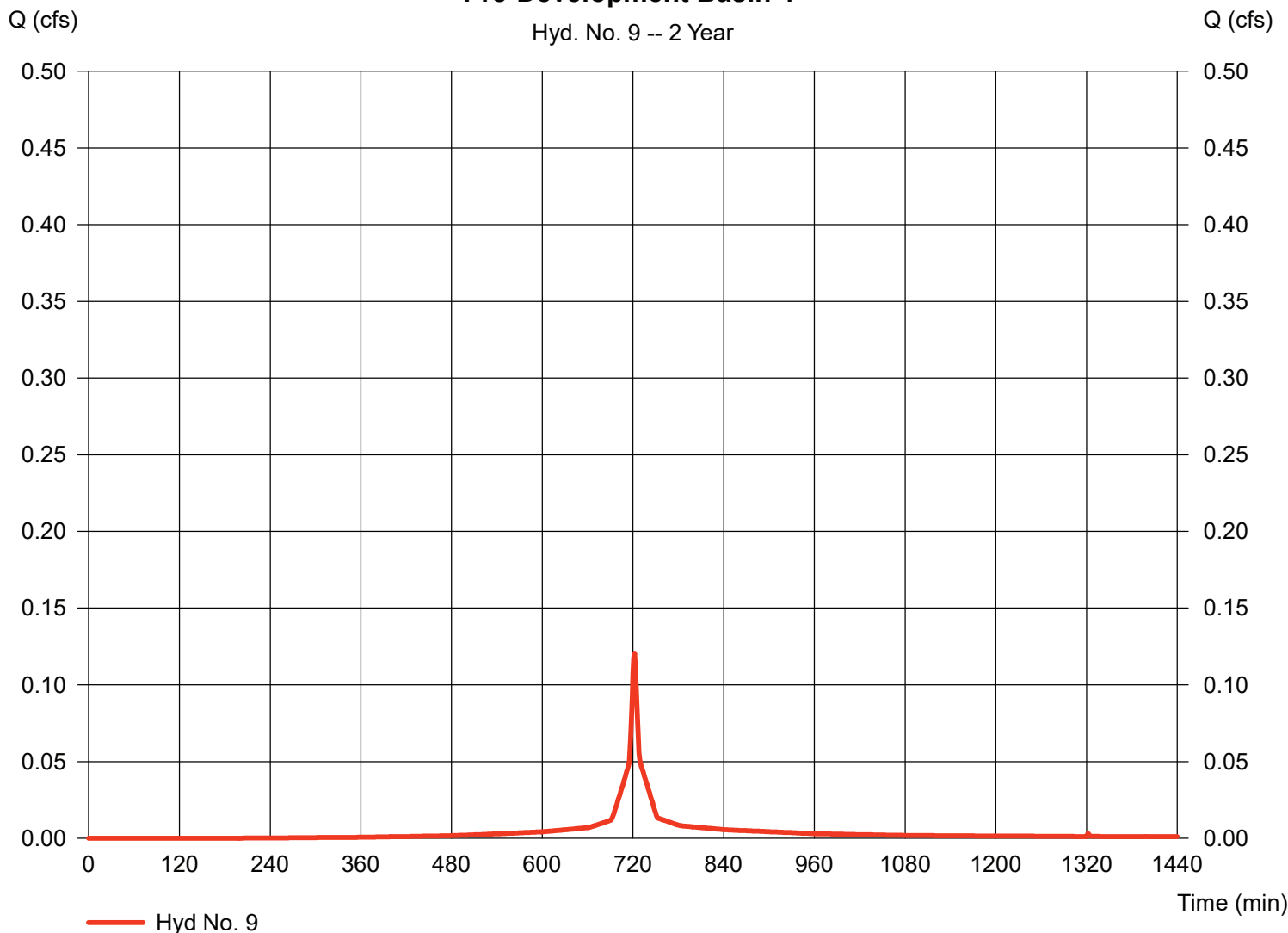
Hydrograph type = SCS Runoff  
 Storm frequency = 2 yrs  
 Time interval = 1 min  
 Drainage area = 0.030 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 4.10 in  
 Storm duration = 24 hrs

Peak discharge = 0.121 cfs  
 Time to peak = 722 min  
 Hyd. volume = 349 cuft  
 Curve number = 94\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 2.00 min  
 Distribution = Type III  
 Shape factor = 484

\* Composite (Area/CN) =  $[(0.020 \times 98) + (0.010 \times 85)] / 0.030$

### Pre-Development Basin 4

Hyd. No. 9 -- 2 Year





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

## Hyd. No. 10

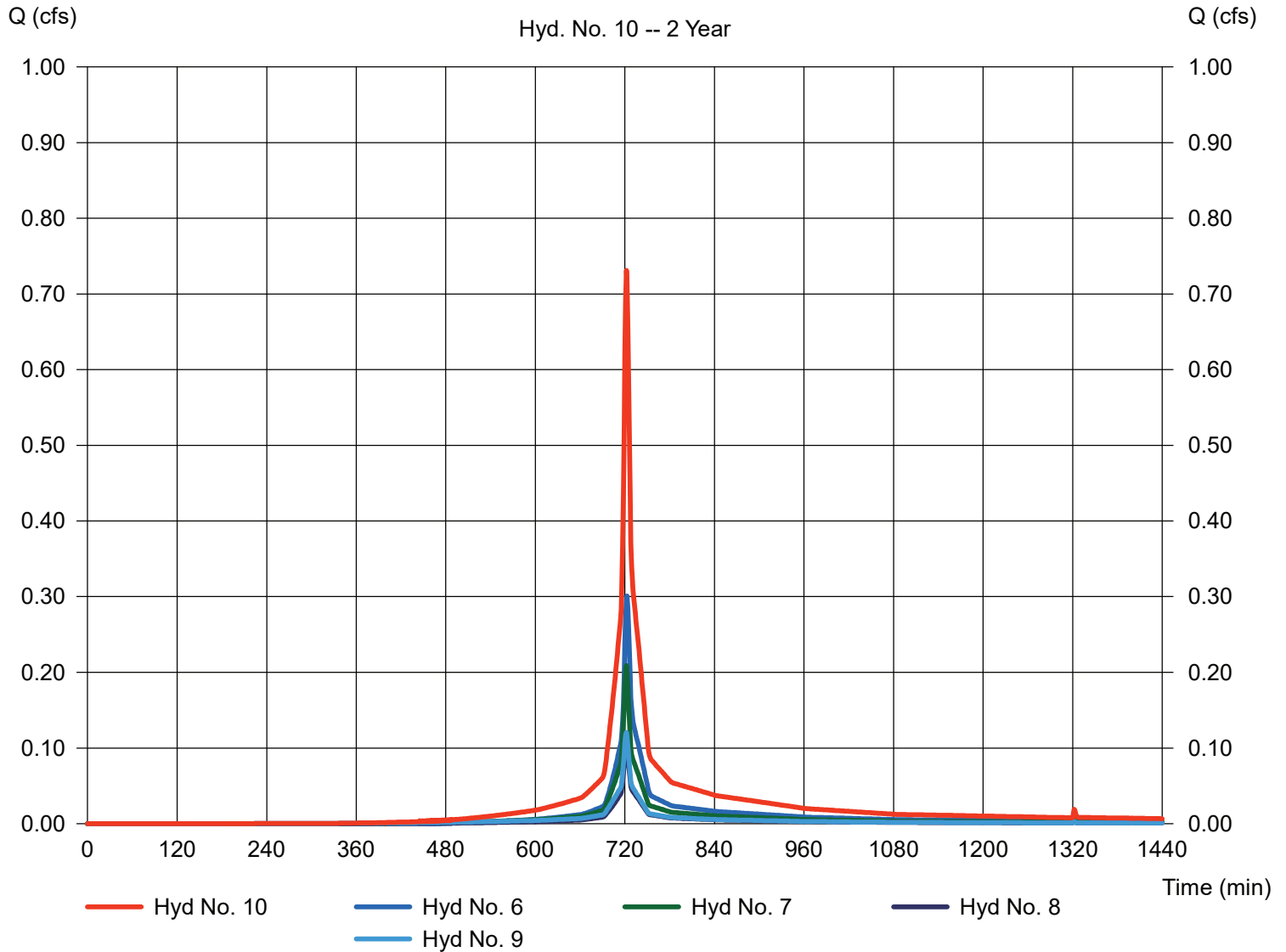
Total Flow to Lower Detention

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Time interval = 1 min  
Inflow hyds. = 6, 7, 8, 9

Peak discharge = 0.731 cfs  
Time to peak = 722 min  
Hyd. volume = 2,051 cuft  
Contrib. drain. area = 0.120 ac

### Total Flow to Lower Detention

Hyd. No. 10 -- 2 Year



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

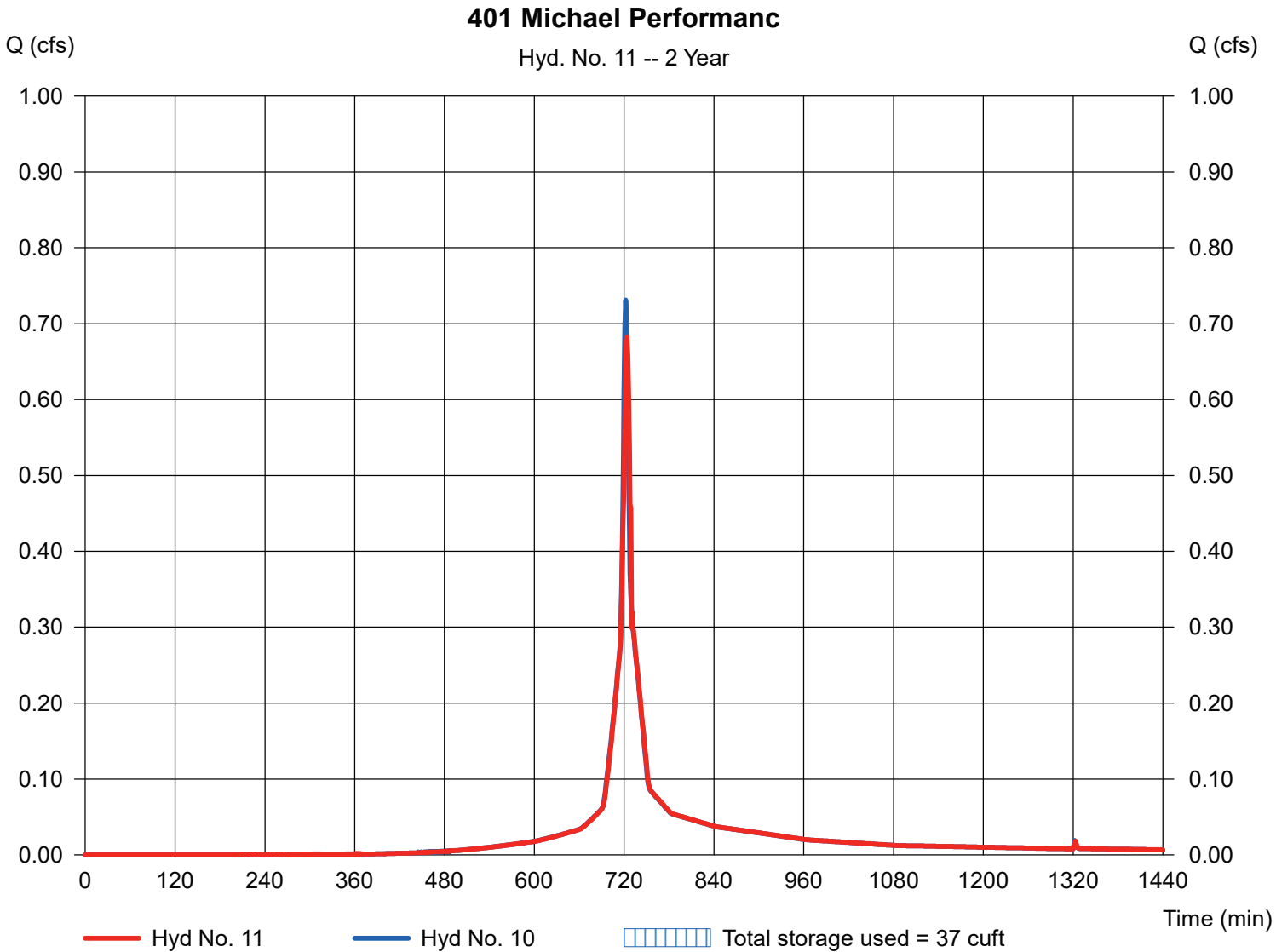
## Hyd. No. 11

401 Michael Performanc

Hydrograph type = Reservoir  
Storm frequency = 2 yrs  
Time interval = 1 min  
Inflow hyd. No. = 10 - Total Flow to Lower Detention  
Reservoir name = 401 Michael Detention

Peak discharge = 0.683 cfs  
Time to peak = 724 min  
Hyd. volume = 2,051 cuft  
Max. Elevation = 75.69 ft  
Max. Storage = 37 cuft

Storage Indication method used.





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

## Hyd. No. 12

### Post-Development Basin 5

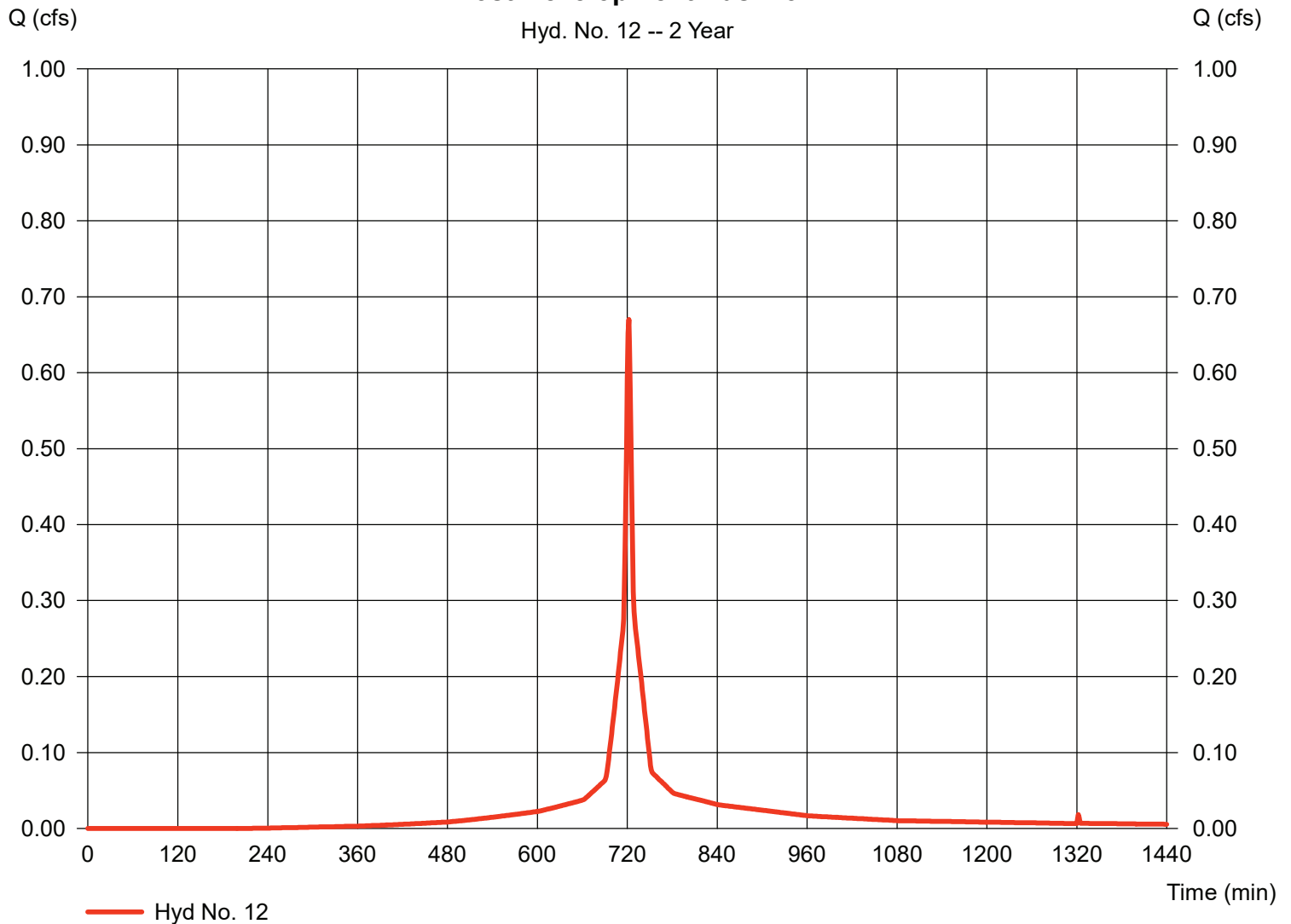
Hydrograph type = SCS Runoff  
 Storm frequency = 2 yrs  
 Time interval = 1 min  
 Drainage area = 0.170 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 4.10 in  
 Storm duration = 24 hrs

Peak discharge = 0.670 cfs  
 Time to peak = 722 min  
 Hyd. volume = 1,919 cuft  
 Curve number = 93\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 2.90 min  
 Distribution = Type III  
 Shape factor = 484

\* Composite (Area/CN) = [(0.100 x 98) + (0.020 x 85) + (0.050 x 86)] / 0.170

### Post-Development Basin 5

Hyd. No. 12 -- 2 Year





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

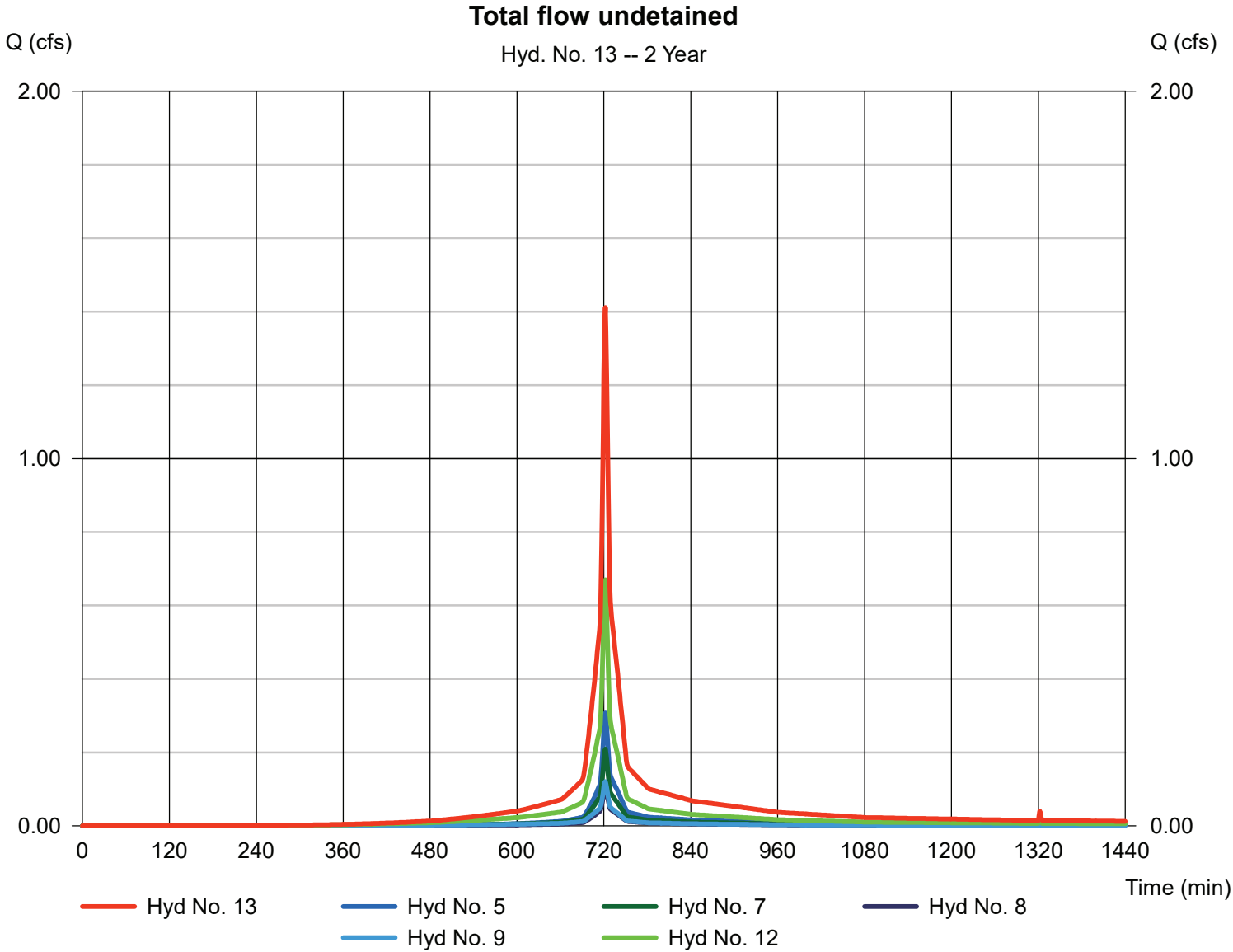
Monday, Dec 6, 2021

## Hyd. No. 13

Total flow undetained

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Time interval = 1 min  
Inflow hyds. = 5, 7, 8, 9, 12

Peak discharge = 1.411 cfs  
Time to peak = 722 min  
Hyd. volume = 3,970 cuft  
Contrib. drain. area = 0.390 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

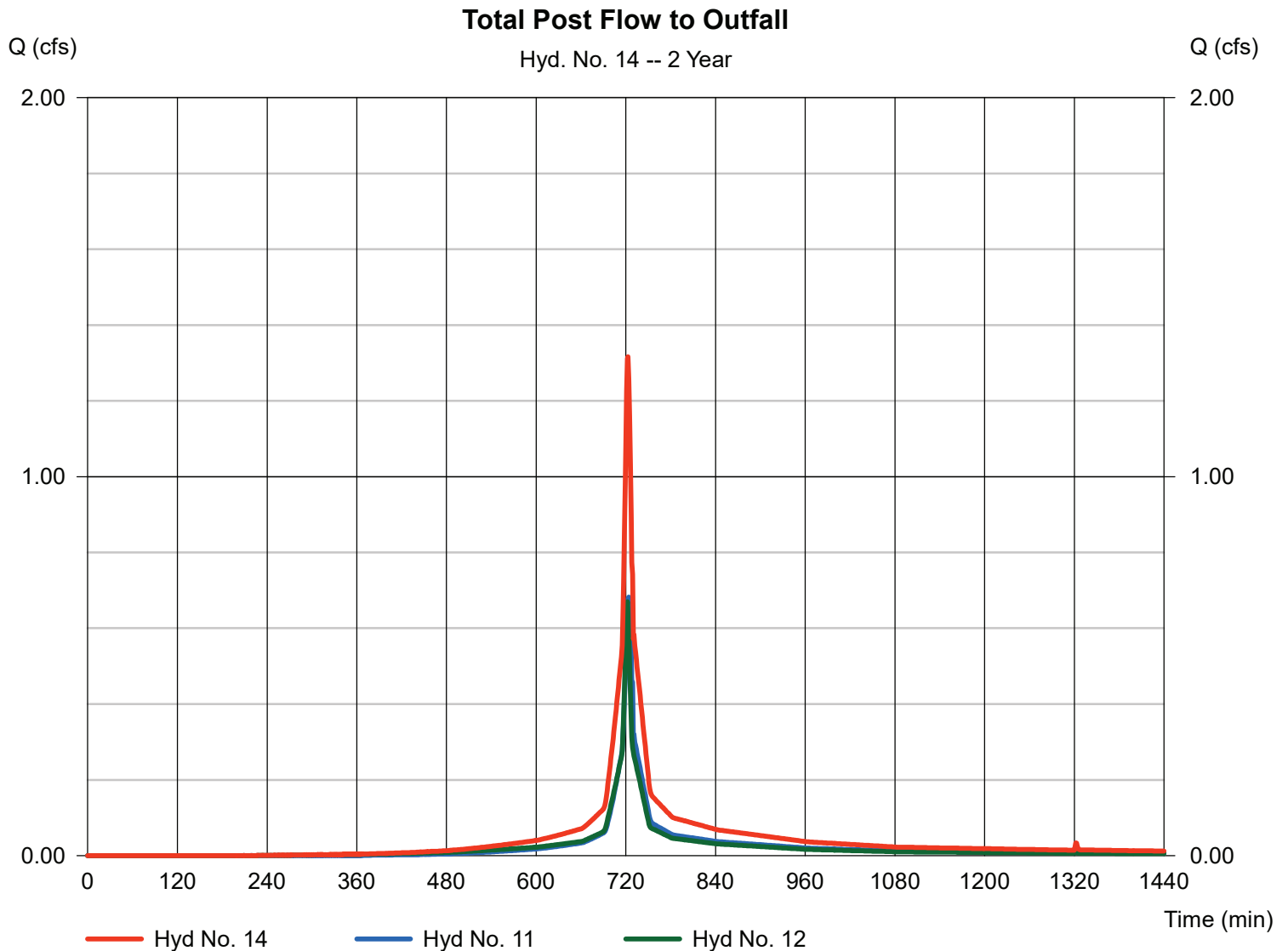
Monday, Dec 6, 2021

## Hyd. No. 14

Total Post Flow to Outfall

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Time interval = 1 min  
Inflow hyds. = 11, 12

Peak discharge = 1.316 cfs  
Time to peak = 723 min  
Hyd. volume = 3,970 cuft  
Contrib. drain. area = 0.170 ac



# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

| Hyd. No.             | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Hyd. volume (cuft)    | Inflow hyd(s)  | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph description                |
|----------------------|--------------------------|-----------------|---------------------|--------------------|-----------------------|----------------|------------------------|-------------------------|---------------------------------------|
| 1                    | SCS Runoff               | 0.362           | 1                   | 722                | 990                   | ---            | ----                   | ----                    | Pre-Development Basin 1               |
| 2                    | SCS Runoff               | 1.336           | 1                   | 723                | 3,954                 | ---            | ----                   | ----                    | Pre-Development Basin 2               |
| 3                    | Combine                  | 1.683           | 1                   | 723                | 4,945                 | 1, 2           | ----                   | ----                    | Total Pre-Development Flow to Outfall |
| 5                    | SCS Runoff               | 0.402           | 1                   | 722                | 1,101                 | ---            | ----                   | ----                    | Post-Development Basin 1              |
| 6                    | Reservoir                | 0.393           | 1                   | 723                | 1,100                 | 5              | 86.18                  | 21.9                    | Upper Detention                       |
| 7                    | SCS Runoff               | 0.266           | 1                   | 722                | 741                   | ---            | ----                   | ----                    | Post-Development Basin 2              |
| 8                    | SCS Runoff               | 0.133           | 1                   | 722                | 371                   | ---            | ----                   | ----                    | Post-Development Basin 3              |
| 9                    | SCS Runoff               | 0.148           | 1                   | 722                | 436                   | ---            | ----                   | ----                    | Pre-Development Basin 4               |
| 10                   | Combine                  | 0.937           | 1                   | 722                | 2,648                 | 6, 7, 8, 9     | ----                   | ----                    | Total Flow to Lower Detention         |
| 11                   | Reservoir                | 0.844           | 1                   | 724                | 2,648                 | 10             | 76.04                  | 59.4                    | 401 Michael Performanc                |
| 12                   | SCS Runoff               | 0.829           | 1                   | 722                | 2,406                 | ---            | ----                   | ----                    | Post-Development Basin 5              |
| 13                   | Combine                  | 1.778           | 1                   | 722                | 5,054                 | 5, 7, 8, 9, 12 | ----                   | ----                    | Total flow undetained                 |
| 14                   | Combine                  | 1.631           | 1                   | 722                | 5,054                 | 11, 12,        | ----                   | ----                    | Total Post Flow to Outfall            |
| 401MichaelBasins.gpw |                          |                 |                     |                    | Return Period: 5 Year |                |                        | Monday, Dec 6, 2021     |                                       |

# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

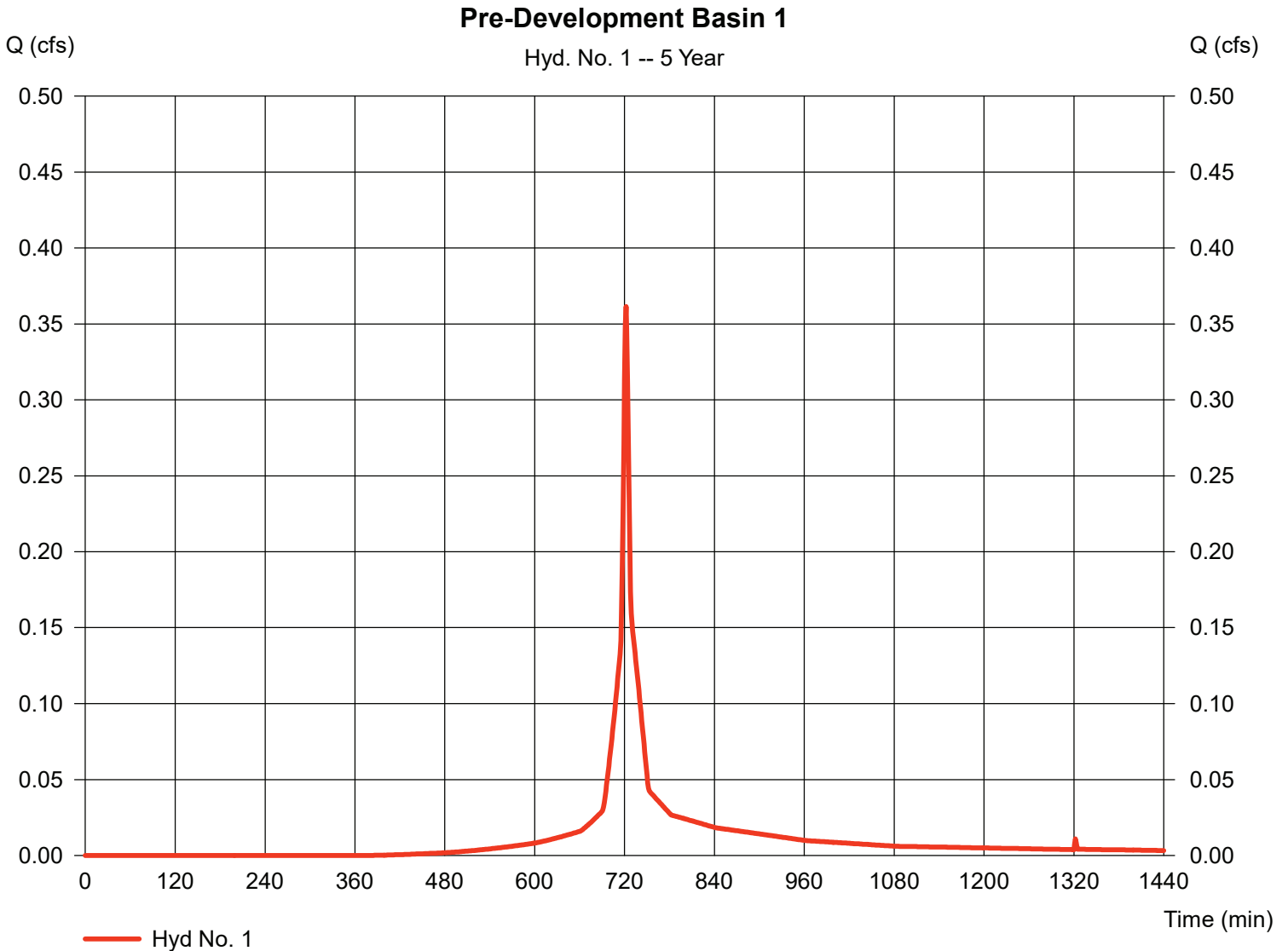
## Hyd. No. 1

### Pre-Development Basin 1

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Time interval = 1 min  
Drainage area = 0.090 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.96 in  
Storm duration = 24 hrs

Peak discharge = 0.362 cfs  
Time to peak = 722 min  
Hyd. volume = 990 cuft  
Curve number = 84\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.020 \times 85) + (0.070 \times 84)] / 0.090$





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

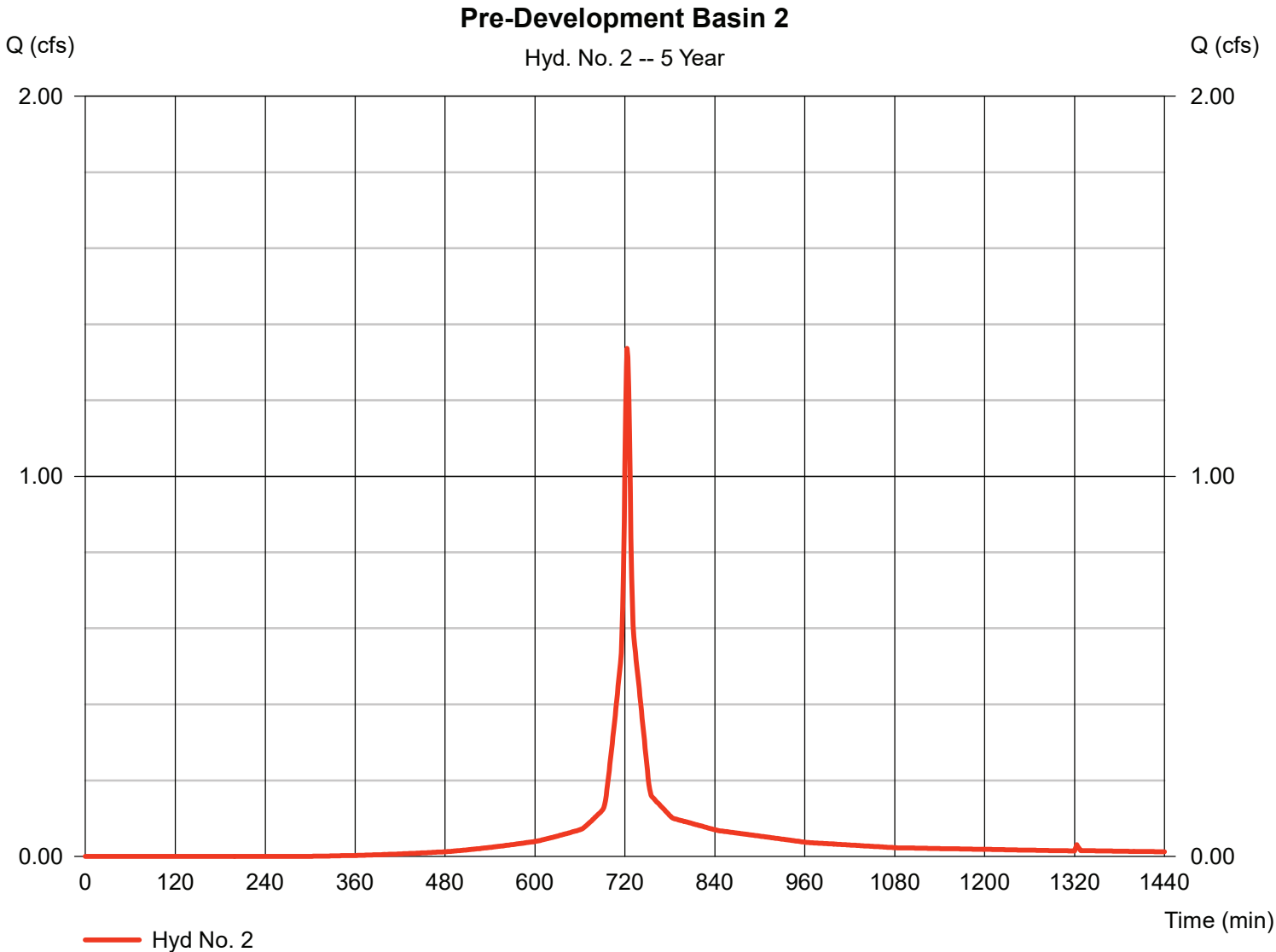
## Hyd. No. 2

### Pre-Development Basin 2

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Time interval = 1 min  
Drainage area = 0.300 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.96 in  
Storm duration = 24 hrs

Peak discharge = 1.336 cfs  
Time to peak = 723 min  
Hyd. volume = 3,954 cuft  
Curve number = 88\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 3.70 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.054 \times 83) + (0.123 \times 86) + (0.057 \times 98) + (0.064 \times 85)] / 0.300$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

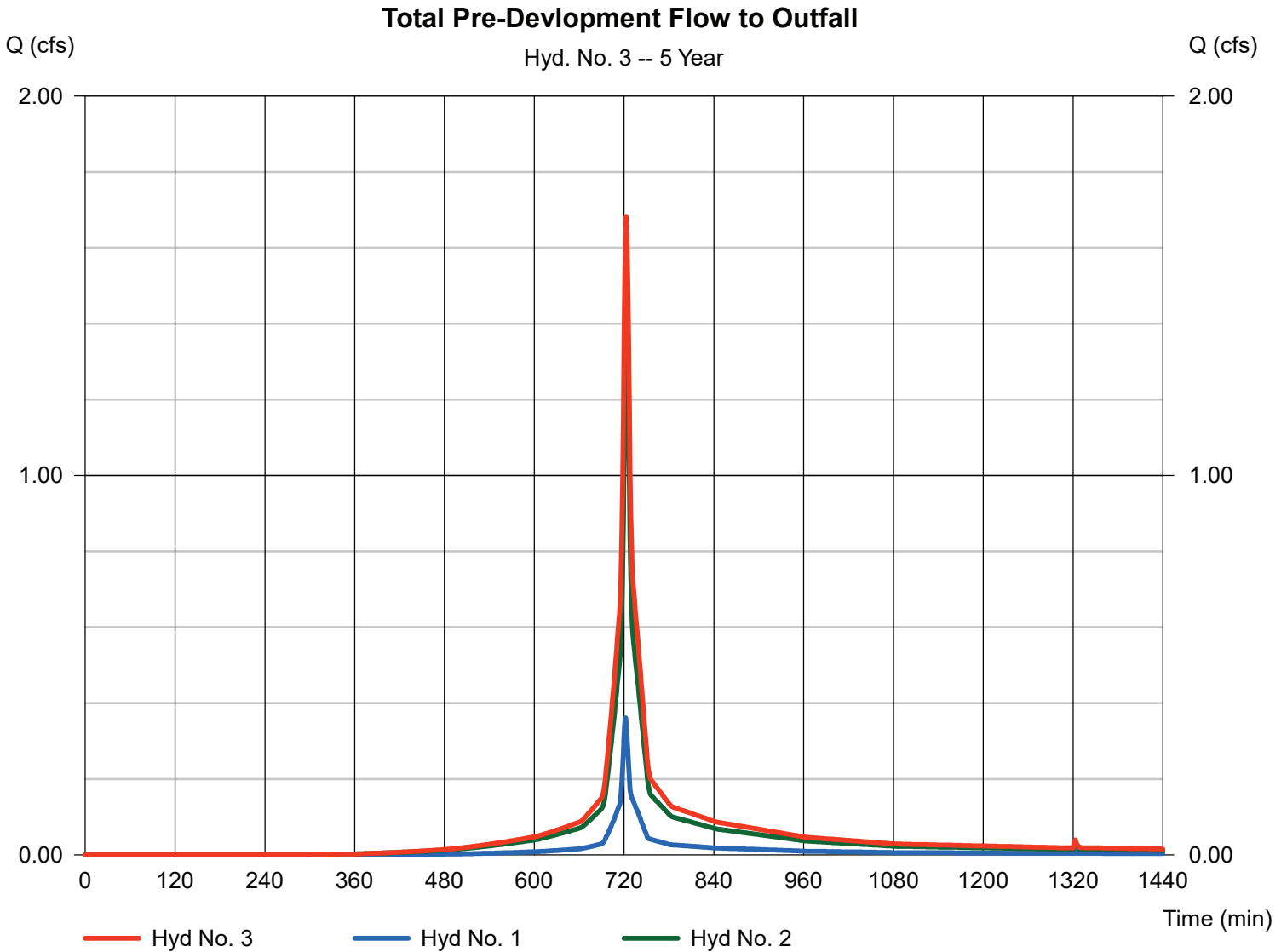
Monday, Dec 6, 2021

## Hyd. No. 3

Total Pre-Development Flow to Outfall

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Time interval = 1 min  
Inflow hyds. = 1, 2

Peak discharge = 1.683 cfs  
Time to peak = 723 min  
Hyd. volume = 4,945 cuft  
Contrib. drain. area = 0.390 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

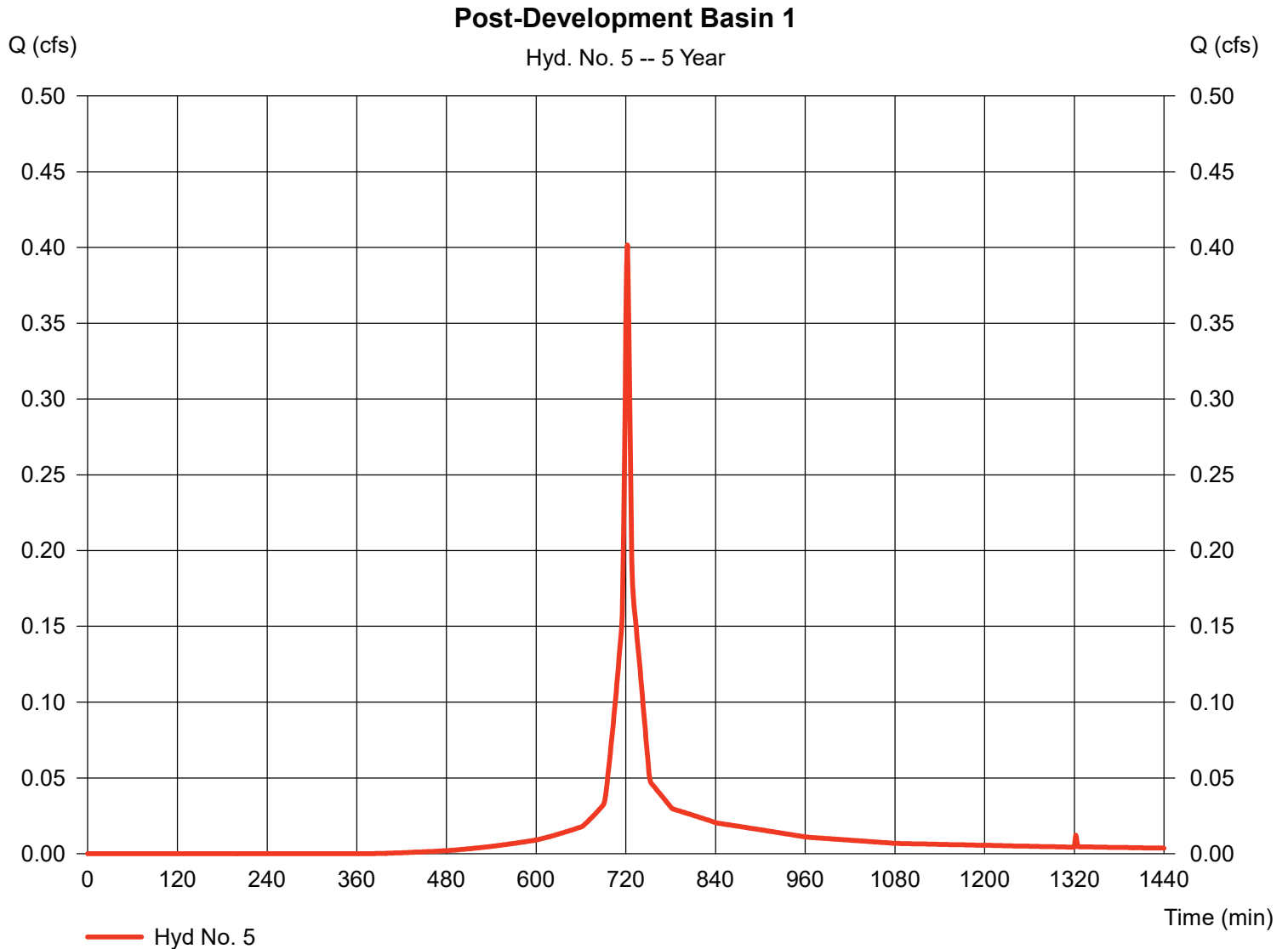
## Hyd. No. 5

### Post-Development Basin 1

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Time interval = 1 min  
Drainage area = 0.100 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.96 in  
Storm duration = 24 hrs

Peak discharge = 0.402 cfs  
Time to peak = 722 min  
Hyd. volume = 1,101 cuft  
Curve number = 84\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) = [(0.020 x 98) + (0.020 x 83) + (0.060 x 80)] / 0.100



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

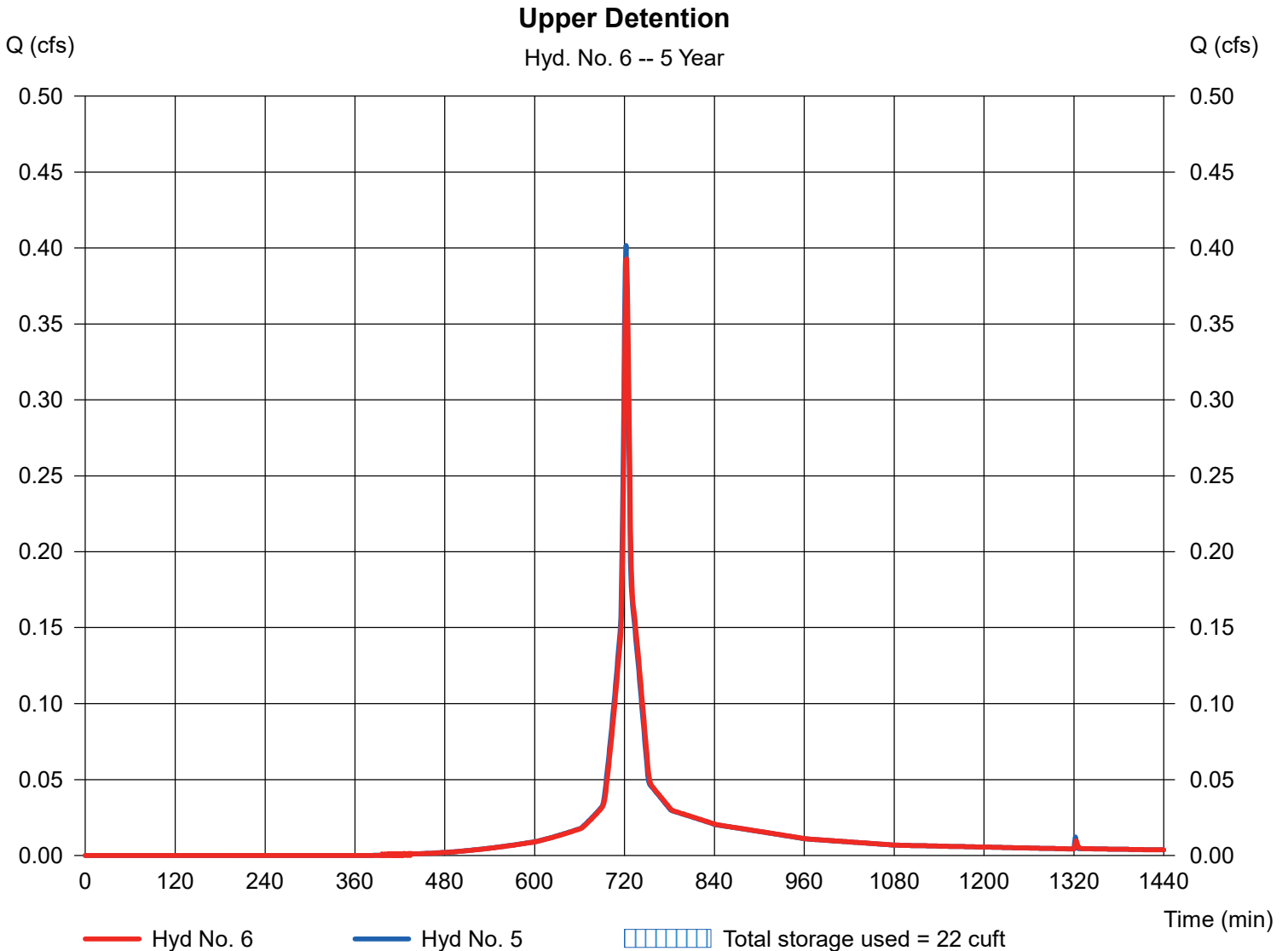
## Hyd. No. 6

Upper Detention

Hydrograph type = Reservoir  
Storm frequency = 5 yrs  
Time interval = 1 min  
Inflow hyd. No. = 5 - Post-Development Basin 1  
Reservoir name = 401 Upper Detention

Peak discharge = 0.393 cfs  
Time to peak = 723 min  
Hyd. volume = 1,100 cuft  
Max. Elevation = 86.18 ft  
Max. Storage = 22 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

## Hyd. No. 7

### Post-Development Basin 2

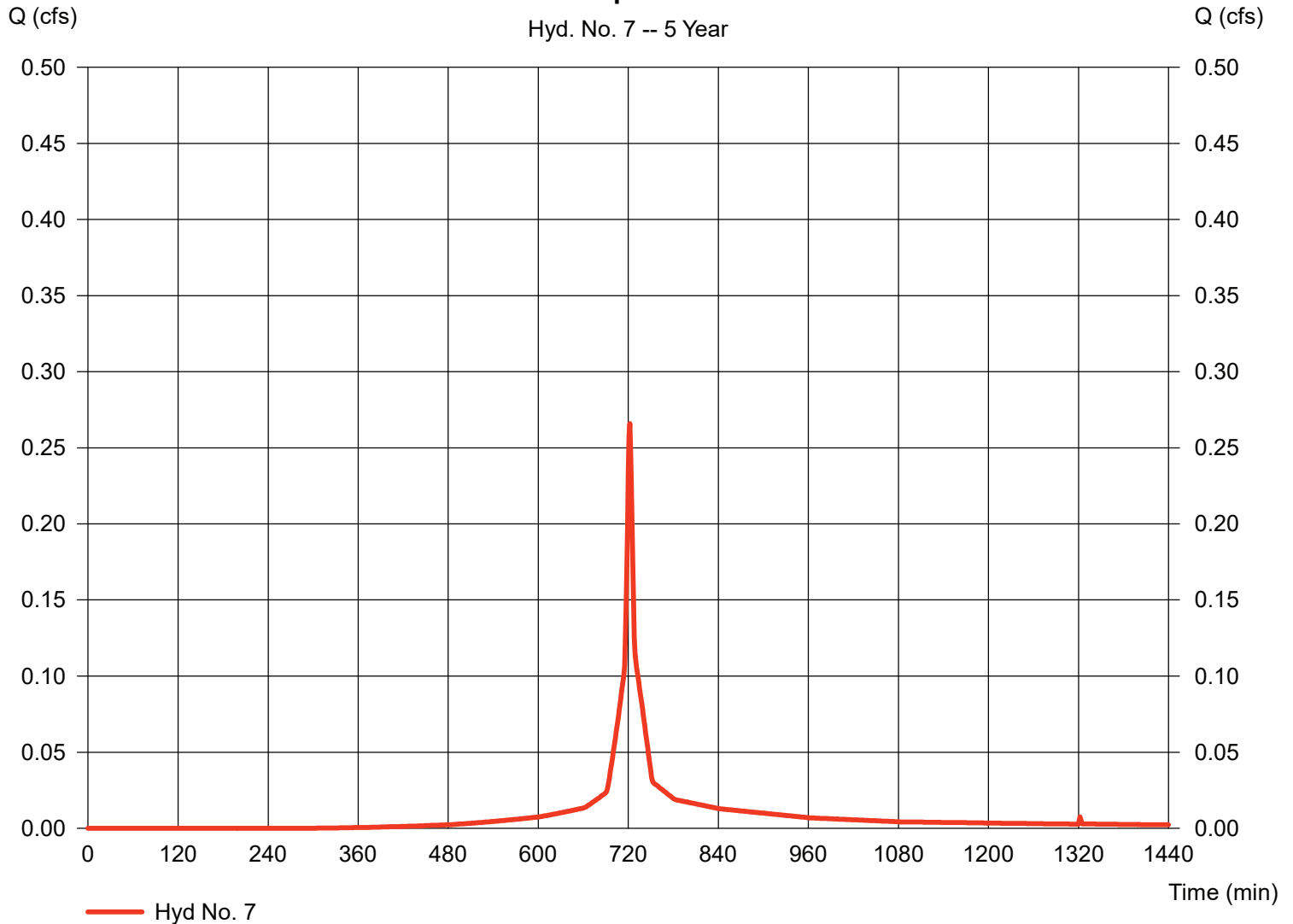
Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Time interval = 1 min  
Drainage area = 0.060 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.96 in  
Storm duration = 24 hrs

Peak discharge = 0.266 cfs  
Time to peak = 722 min  
Hyd. volume = 741 cuft  
Curve number = 88\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.11 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.037 \times 83) + (0.020 \times 98)] / 0.060$

### Post-Development Basin 2

Hyd. No. 7 -- 5 Year





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

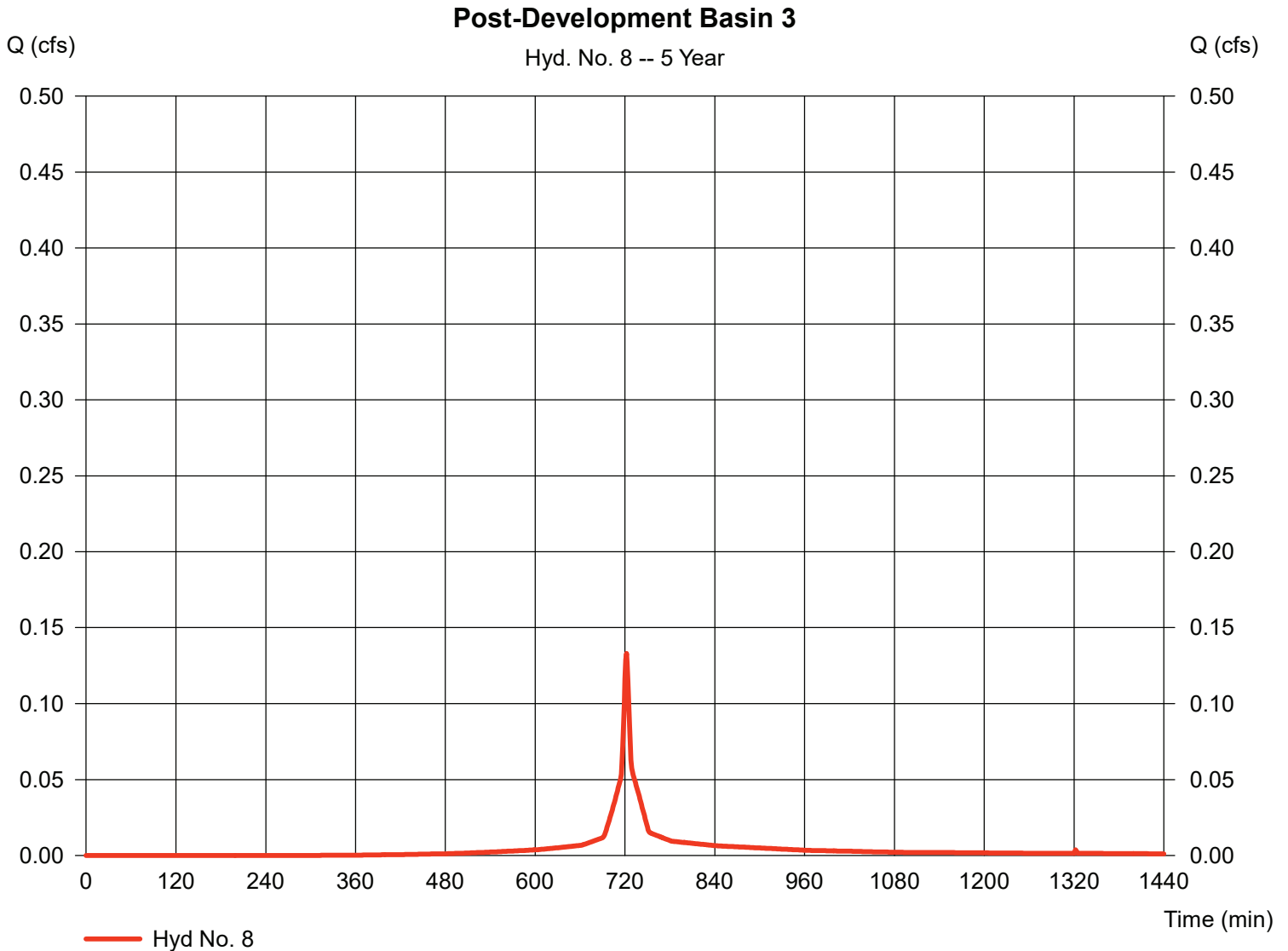
## Hyd. No. 8

### Post-Development Basin 3

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Time interval = 1 min  
Drainage area = 0.030 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.96 in  
Storm duration = 24 hrs

Peak discharge = 0.133 cfs  
Time to peak = 722 min  
Hyd. volume = 371 cuft  
Curve number = 88\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.007 \times 98) + (0.023 \times 85)] / 0.030$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

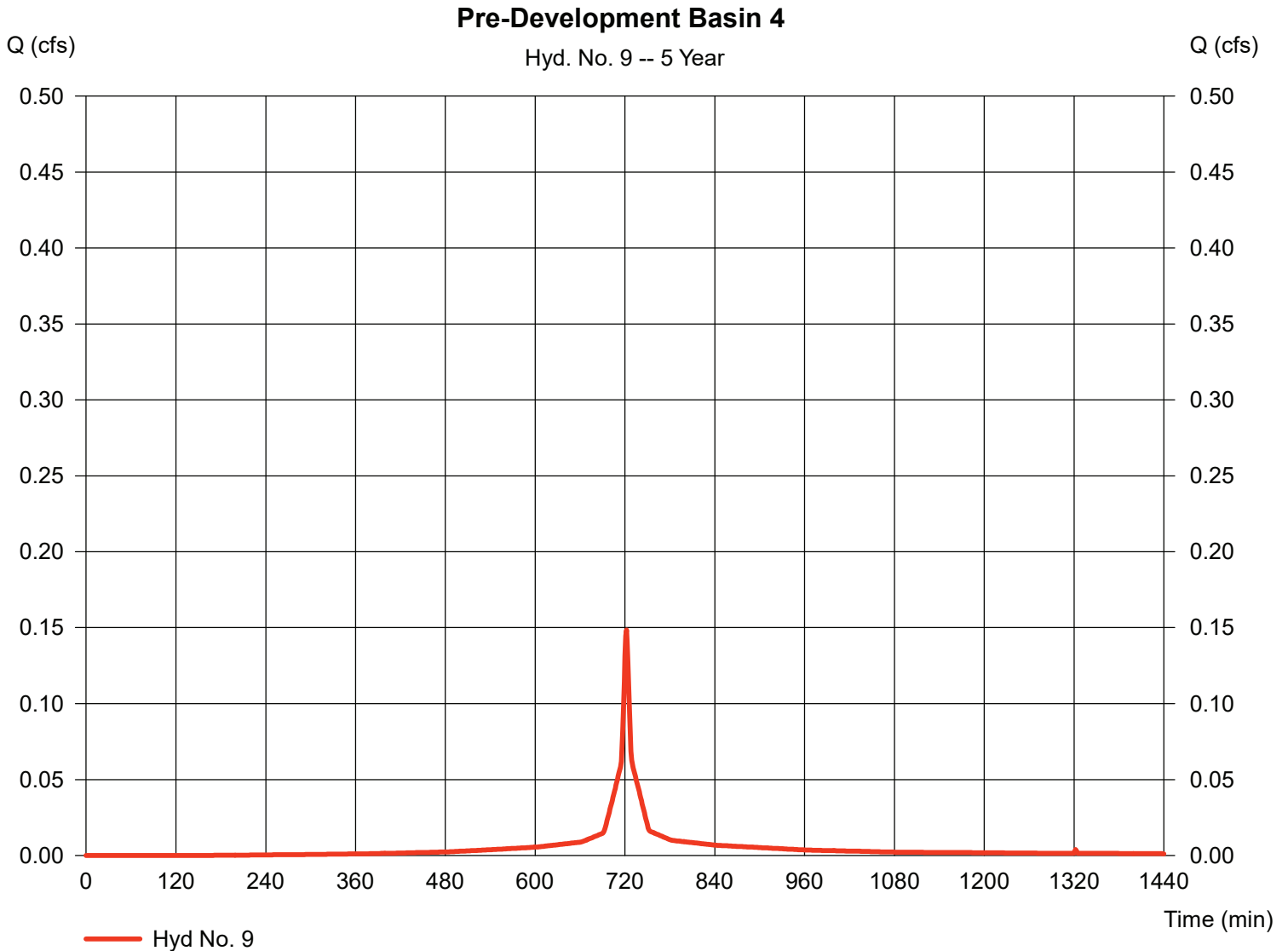
## Hyd. No. 9

### Pre-Development Basin 4

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Time interval = 1 min  
Drainage area = 0.030 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.96 in  
Storm duration = 24 hrs

Peak discharge = 0.148 cfs  
Time to peak = 722 min  
Hyd. volume = 436 cuft  
Curve number = 94\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.020 \times 98) + (0.010 \times 85)] / 0.030$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

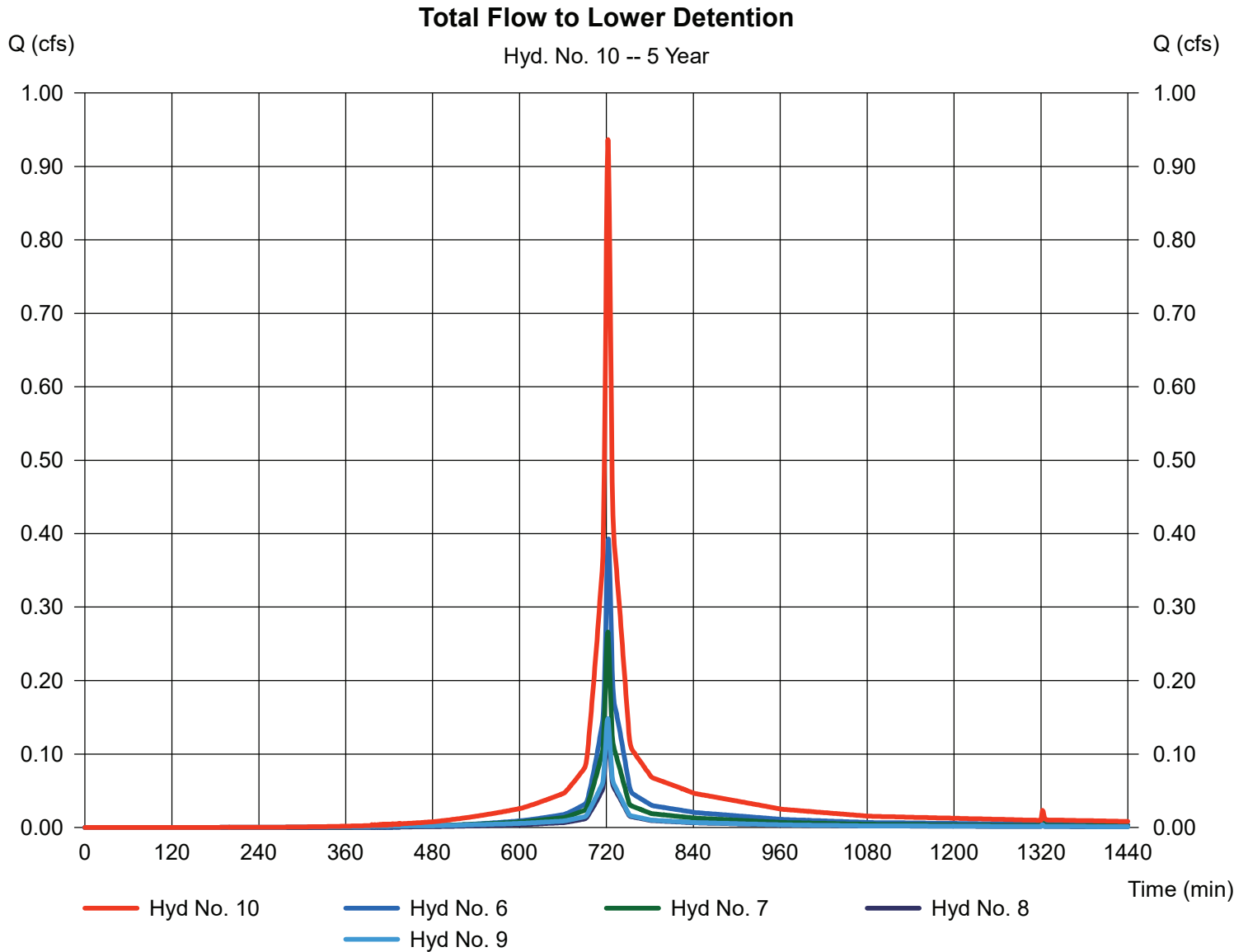
Monday, Dec 6, 2021

## Hyd. No. 10

Total Flow to Lower Detention

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Time interval = 1 min  
Inflow hyds. = 6, 7, 8, 9

Peak discharge = 0.937 cfs  
Time to peak = 722 min  
Hyd. volume = 2,648 cuft  
Contrib. drain. area = 0.120 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

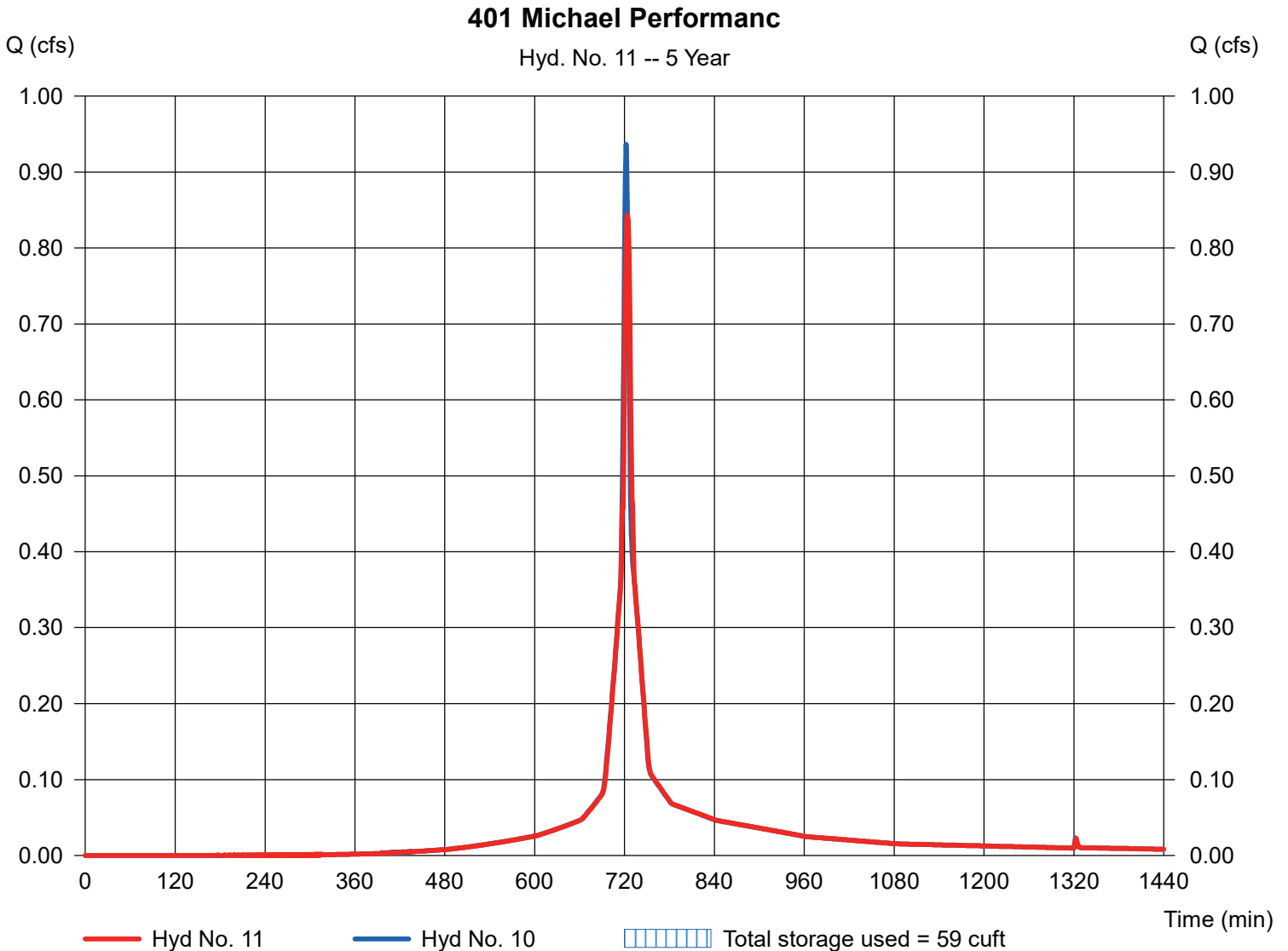
## Hyd. No. 11

401 Michael Performanc

Hydrograph type = Reservoir  
Storm frequency = 5 yrs  
Time interval = 1 min  
Inflow hyd. No. = 10 - Total Flow to Lower Detention  
Reservoir name = 401 Michael Detention

Peak discharge = 0.844 cfs  
Time to peak = 724 min  
Hyd. volume = 2,648 cuft  
Max. Elevation = 76.04 ft  
Max. Storage = 59 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

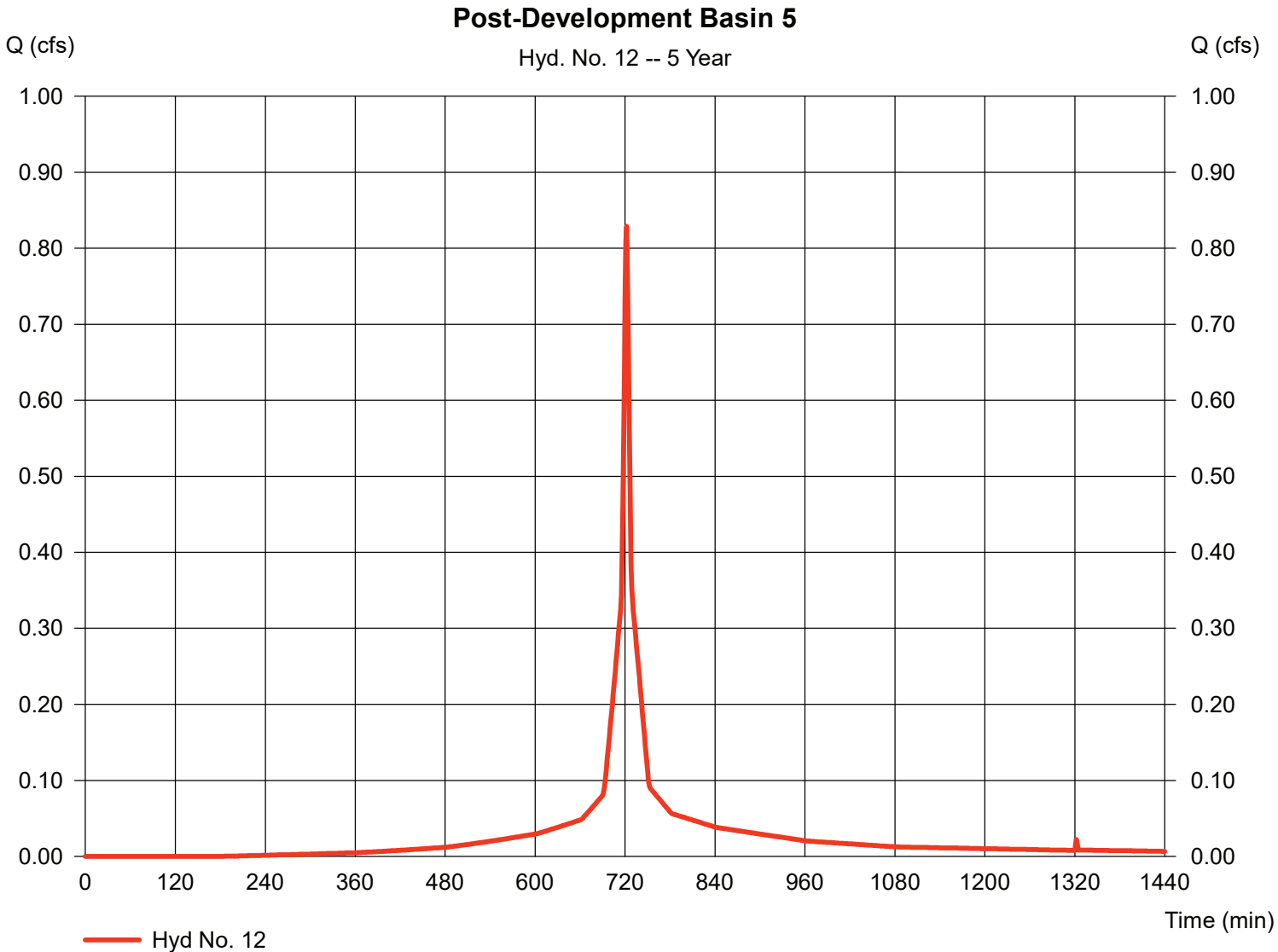
## Hyd. No. 12

### Post-Development Basin 5

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Time interval = 1 min  
Drainage area = 0.170 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.96 in  
Storm duration = 24 hrs

Peak discharge = 0.829 cfs  
Time to peak = 722 min  
Hyd. volume = 2,406 cuft  
Curve number = 93\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.90 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) = [(0.100 x 98) + (0.020 x 85) + (0.050 x 86)] / 0.170





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

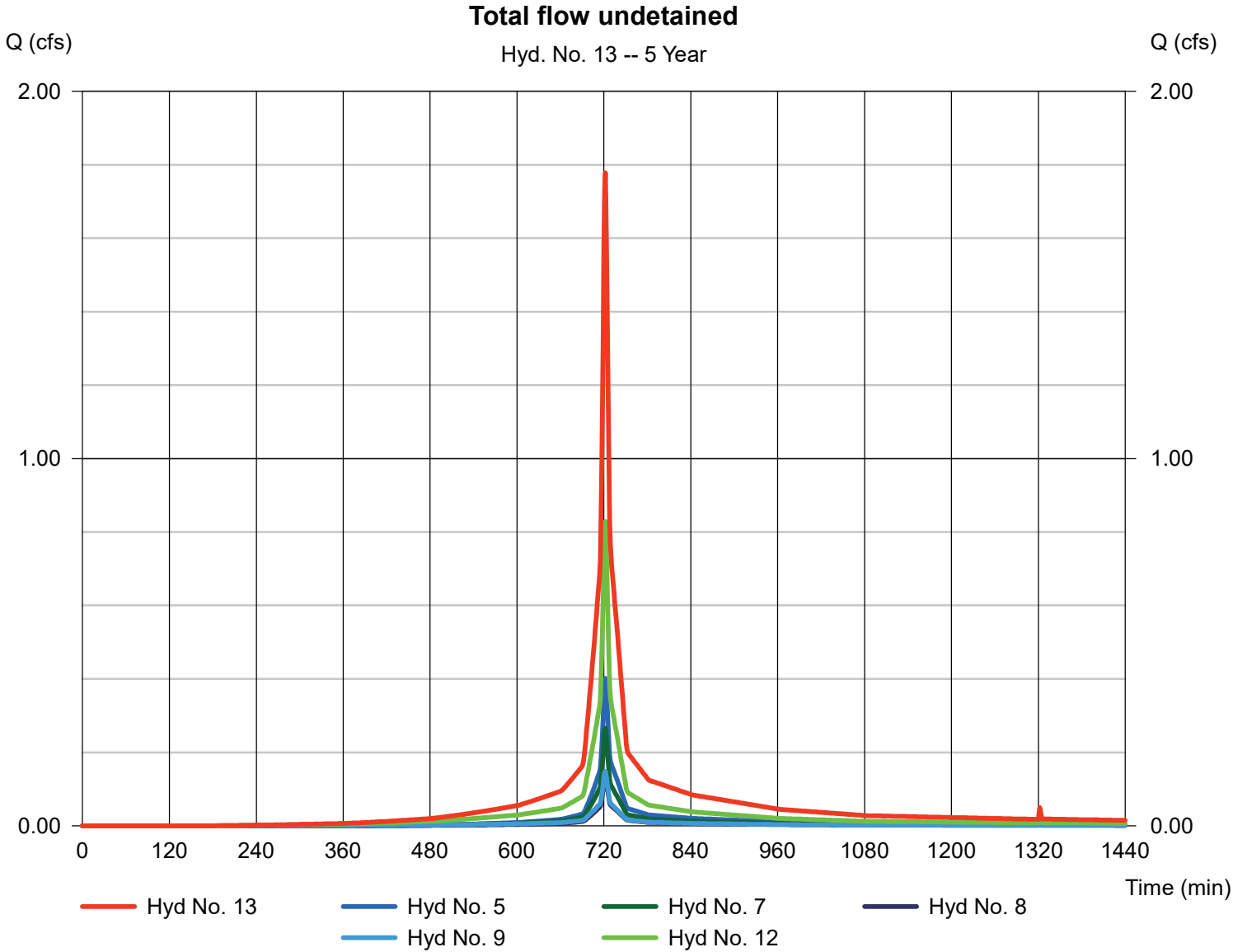
Monday, Dec 6, 2021

## Hyd. No. 13

Total flow undetained

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Time interval = 1 min  
Inflow hyds. = 5, 7, 8, 9, 12

Peak discharge = 1.778 cfs  
Time to peak = 722 min  
Hyd. volume = 5,054 cuft  
Contrib. drain. area = 0.390 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

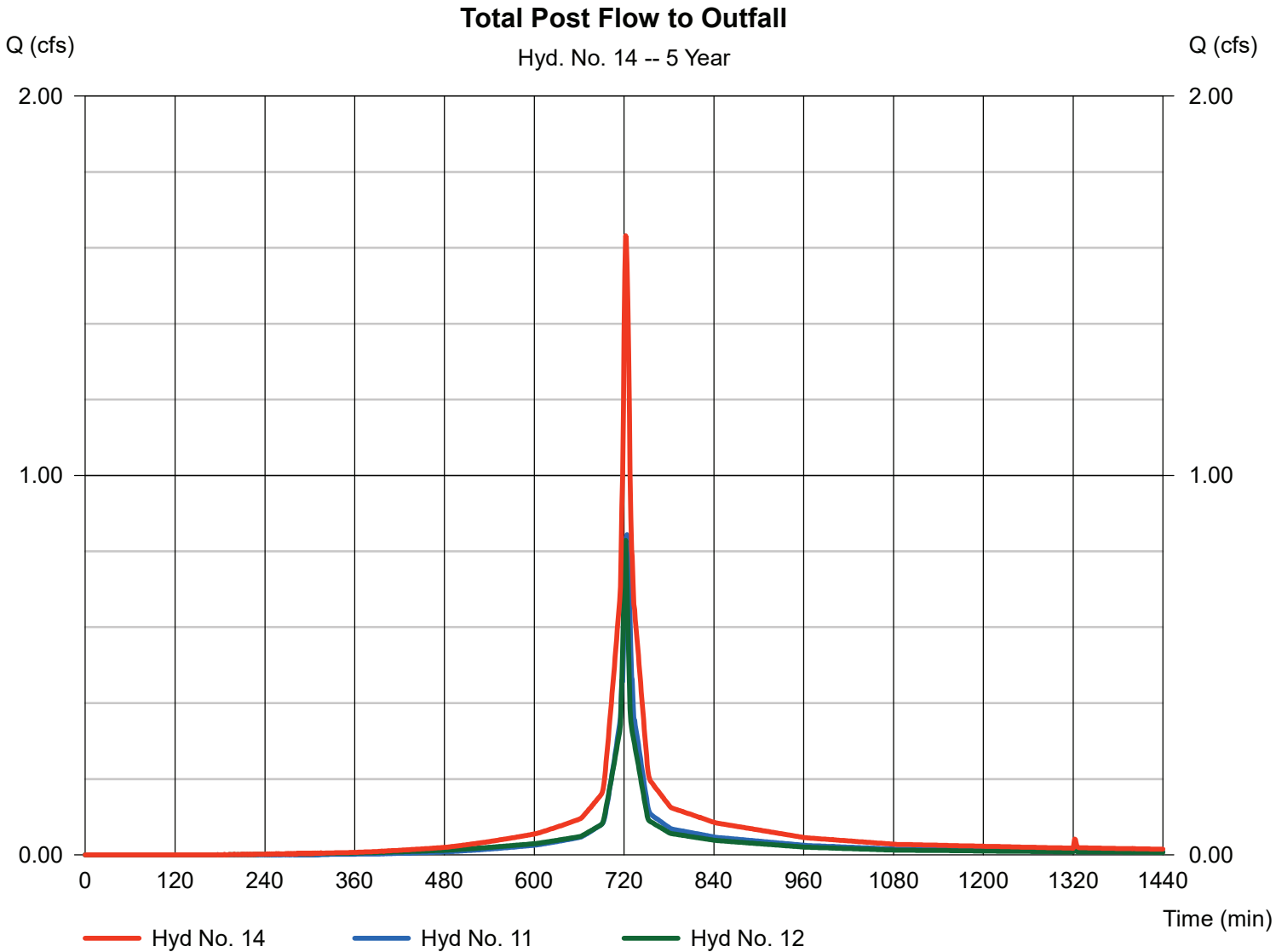
Monday, Dec 6, 2021

## Hyd. No. 14

Total Post Flow to Outfall

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Time interval = 1 min  
Inflow hyds. = 11, 12

Peak discharge = 1.631 cfs  
Time to peak = 722 min  
Hyd. volume = 5,054 cuft  
Contrib. drain. area = 0.170 ac



# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

| Hyd. No.             | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Hyd. volume (cuft)     | Inflow hyd(s)  | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph description                |
|----------------------|--------------------------|-----------------|---------------------|--------------------|------------------------|----------------|------------------------|-------------------------|---------------------------------------|
| 1                    | SCS Runoff               | 0.436           | 1                   | 722                | 1,202                  | ---            | ----                   | -----                   | Pre-Development Basin 1               |
| 2                    | SCS Runoff               | 1.586           | 1                   | 723                | 4,734                  | ---            | ----                   | -----                   | Pre-Development Basin 2               |
| 3                    | Combine                  | 2.004           | 1                   | 723                | 5,936                  | 1, 2           | ----                   | -----                   | Total Pre-Development Flow to Outfall |
| 5                    | SCS Runoff               | 0.484           | 1                   | 722                | 1,336                  | ---            | ----                   | -----                   | Post-Development Basin 1              |
| 6                    | Reservoir                | 0.467           | 1                   | 722                | 1,336                  | 5              | 86.21                  | 25.6                    | Upper Detention                       |
| 7                    | SCS Runoff               | 0.316           | 1                   | 722                | 888                    | ---            | ----                   | -----                   | Post-Development Basin 2              |
| 8                    | SCS Runoff               | 0.158           | 1                   | 722                | 444                    | ---            | ----                   | -----                   | Post-Development Basin 3              |
| 9                    | SCS Runoff               | 0.173           | 1                   | 722                | 511                    | ---            | ----                   | -----                   | Pre-Development Basin 4               |
| 10                   | Combine                  | 1.113           | 1                   | 722                | 3,179                  | 6, 7, 8, 9     | ----                   | -----                   | Total Flow to Lower Detention         |
| 11                   | Reservoir                | 0.933           | 1                   | 725                | 3,179                  | 10             | 76.28                  | 92.2                    | 401 Michael Performanc                |
| 12                   | SCS Runoff               | 0.967           | 1                   | 722                | 2,833                  | ---            | ----                   | -----                   | Post-Development Basin 5              |
| 13                   | Combine                  | 2.097           | 1                   | 722                | 6,012                  | 5, 7, 8, 9, 12 | ----                   | -----                   | Total flow undetained                 |
| 14                   | Combine                  | 1.844           | 1                   | 722                | 6,012                  | 11, 12,        | ----                   | -----                   | Total Post Flow to Outfall            |
| 401MichaelBasins.gpw |                          |                 |                     |                    | Return Period: 10 Year |                |                        | Monday, Dec 6, 2021     |                                       |

# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

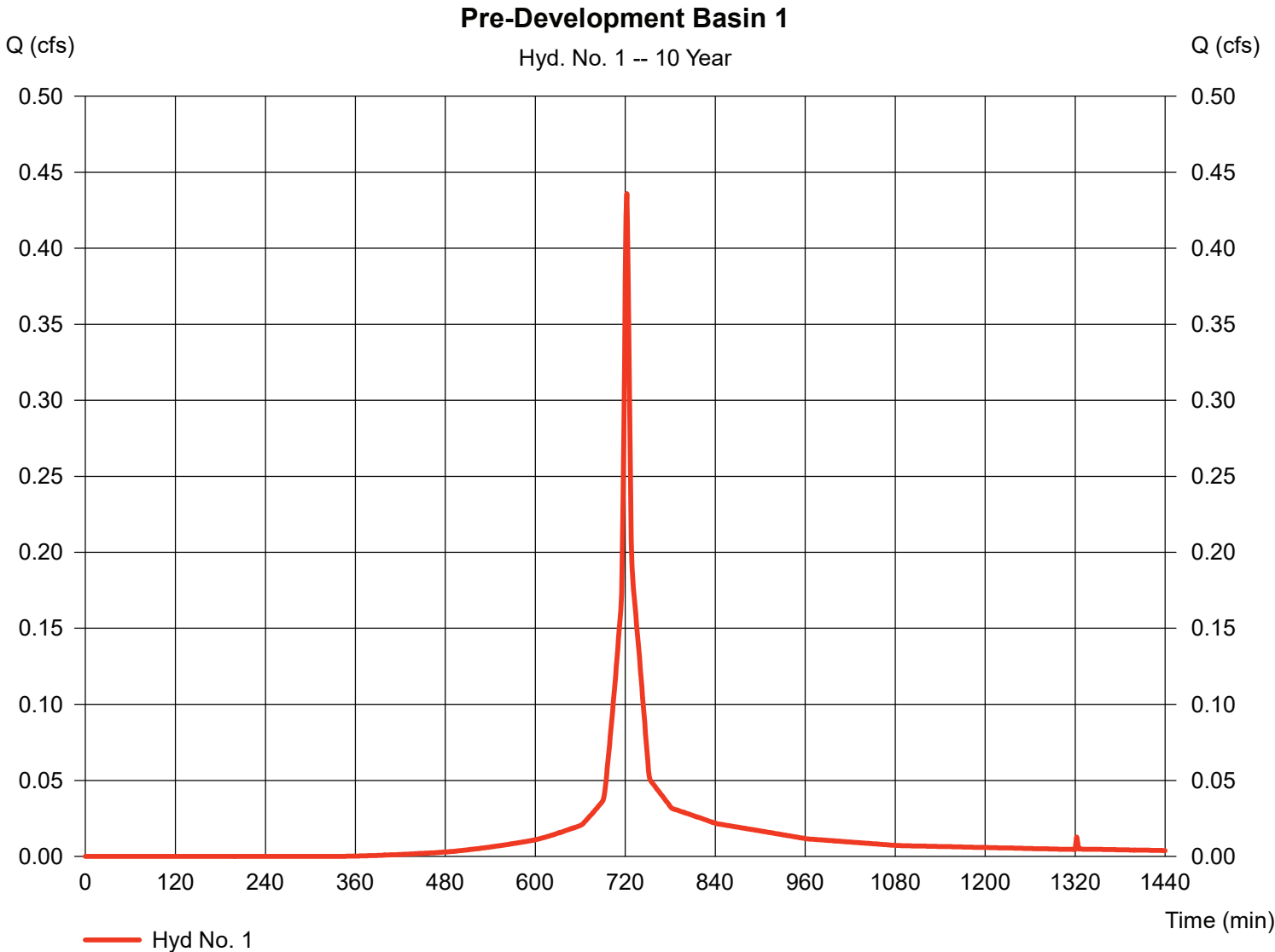
## Hyd. No. 1

### Pre-Development Basin 1

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Time interval = 1 min  
Drainage area = 0.090 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.71 in  
Storm duration = 24 hrs

Peak discharge = 0.436 cfs  
Time to peak = 722 min  
Hyd. volume = 1,202 cuft  
Curve number = 84\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.020 \times 85) + (0.070 \times 84)] / 0.090$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

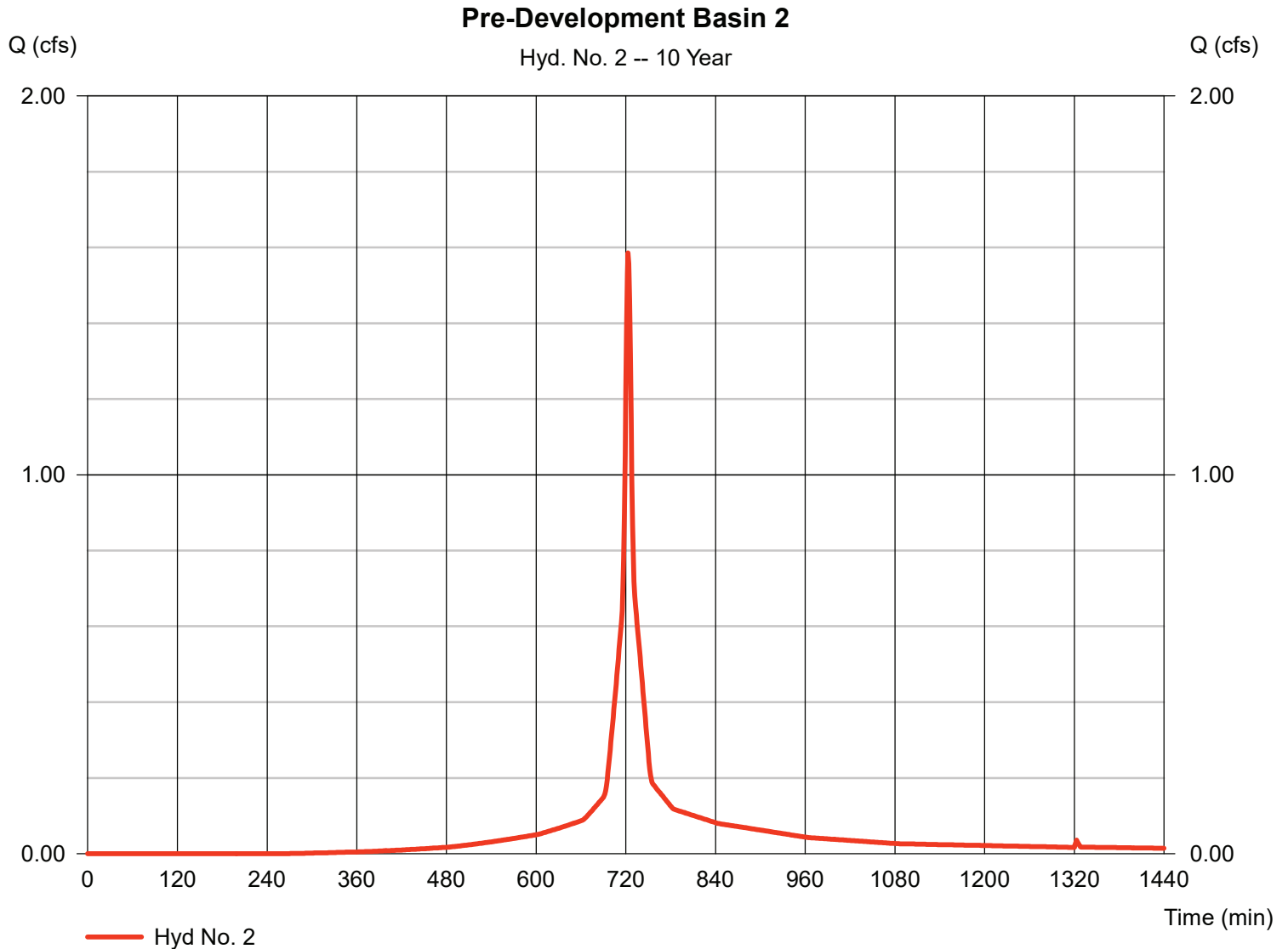
## Hyd. No. 2

### Pre-Development Basin 2

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Time interval = 1 min  
Drainage area = 0.300 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.71 in  
Storm duration = 24 hrs

Peak discharge = 1.586 cfs  
Time to peak = 723 min  
Hyd. volume = 4,734 cuft  
Curve number = 88\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 3.70 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) = [(0.054 x 83) + (0.123 x 86) + (0.057 x 98) + (0.064 x 85)] / 0.300





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

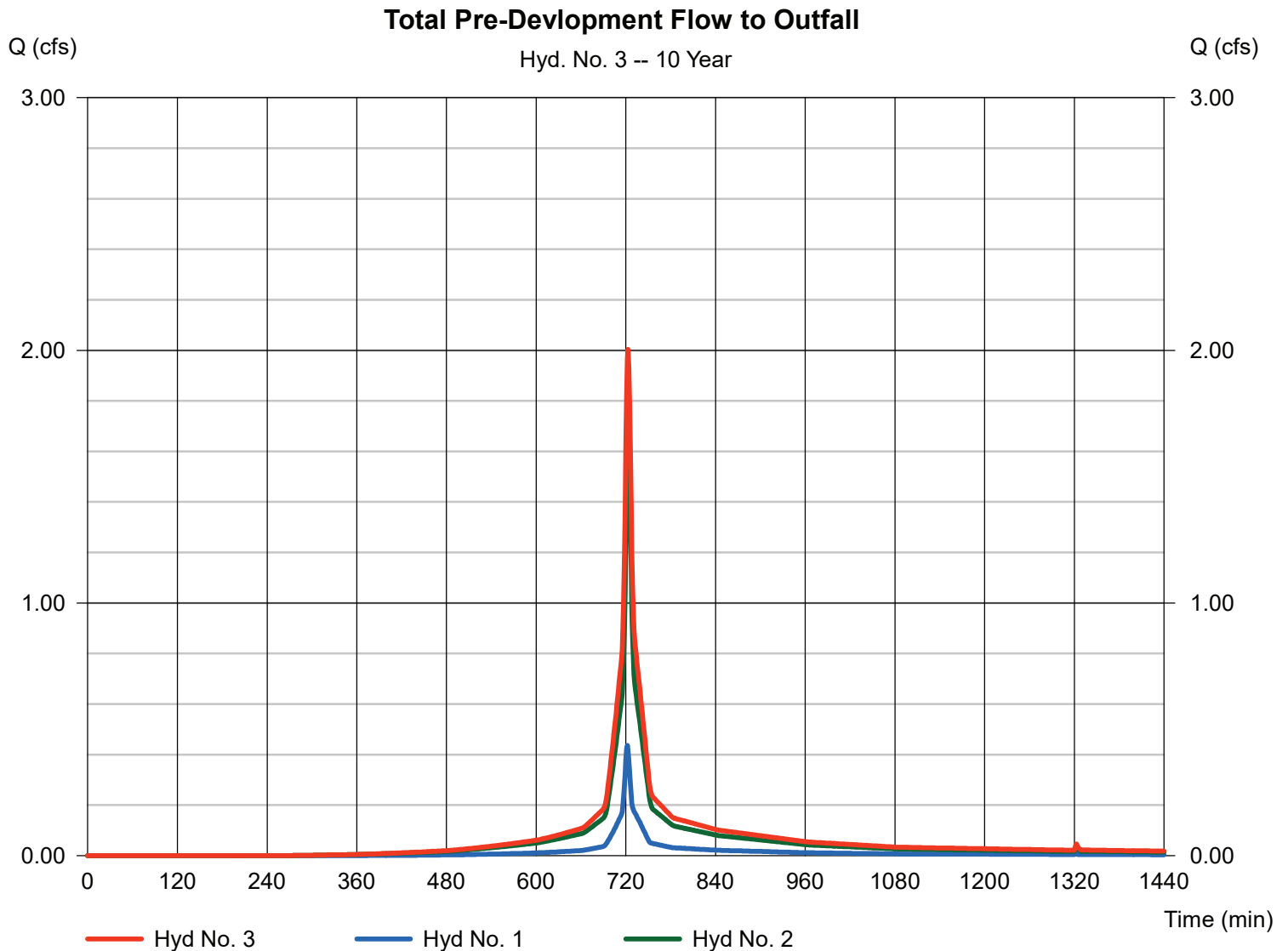
Monday, Dec 6, 2021

## Hyd. No. 3

Total Pre-Development Flow to Outfall

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Time interval = 1 min  
Inflow hyds. = 1, 2

Peak discharge = 2.004 cfs  
Time to peak = 723 min  
Hyd. volume = 5,936 cuft  
Contrib. drain. area = 0.390 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

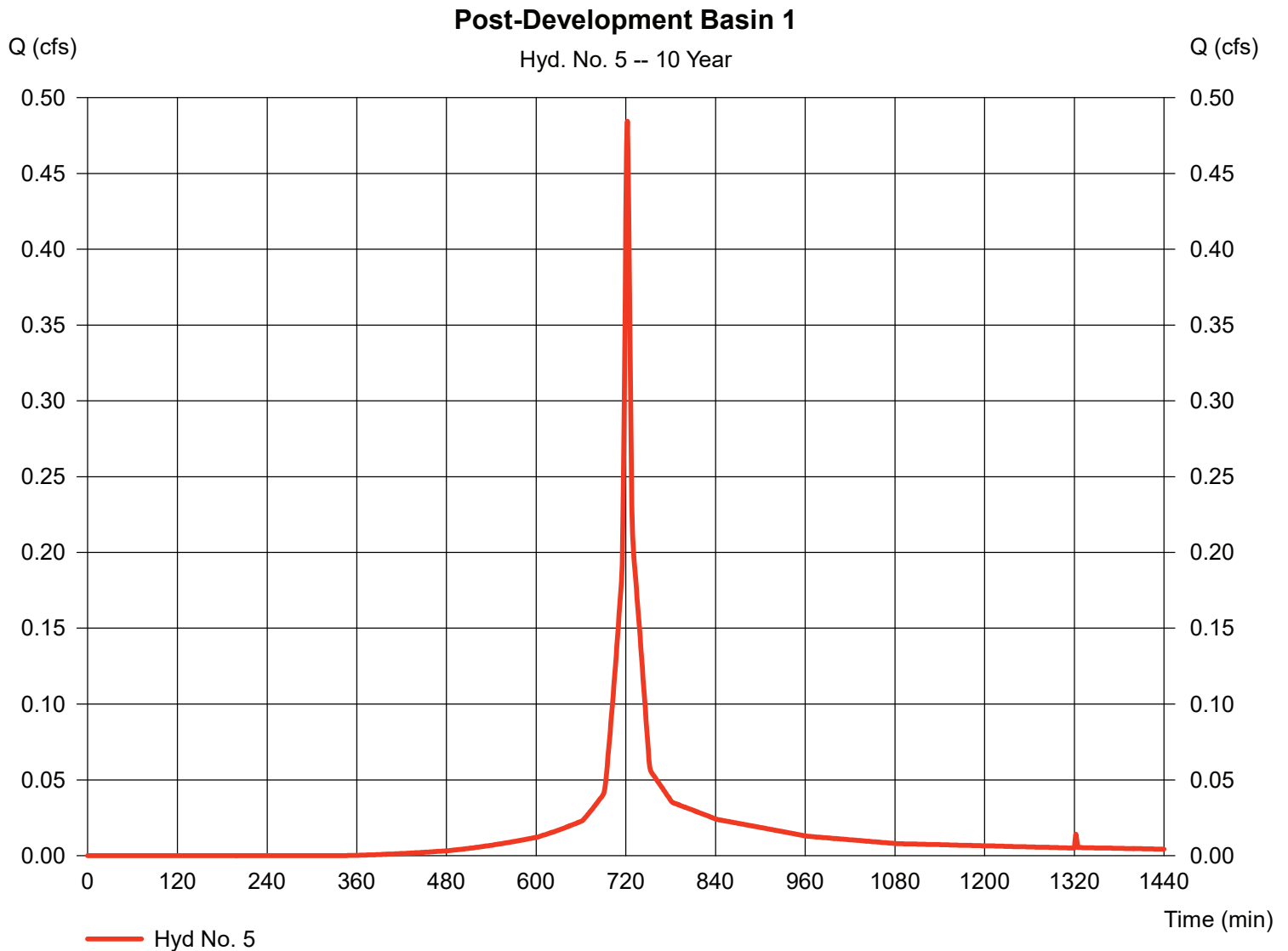
## Hyd. No. 5

### Post-Development Basin 1

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Time interval = 1 min  
Drainage area = 0.100 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.71 in  
Storm duration = 24 hrs

Peak discharge = 0.484 cfs  
Time to peak = 722 min  
Hyd. volume = 1,336 cuft  
Curve number = 84\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) = [(0.020 x 98) + (0.020 x 83) + (0.060 x 80)] / 0.100



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

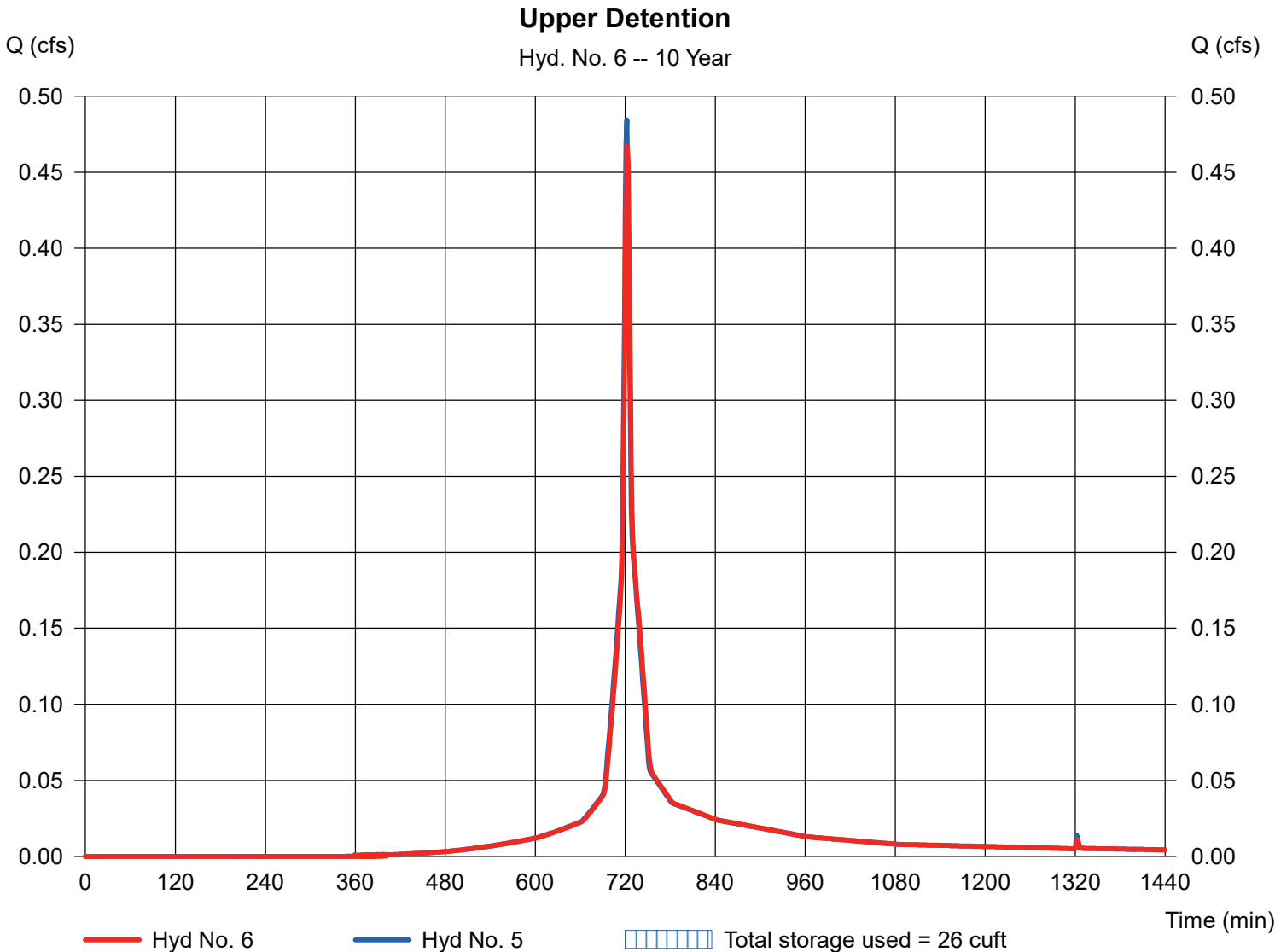
## Hyd. No. 6

Upper Detention

Hydrograph type = Reservoir  
Storm frequency = 10 yrs  
Time interval = 1 min  
Inflow hyd. No. = 5 - Post-Development Basin 1  
Reservoir name = 401 Upper Detention

Peak discharge = 0.467 cfs  
Time to peak = 722 min  
Hyd. volume = 1,336 cuft  
Max. Elevation = 86.21 ft  
Max. Storage = 26 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

## Hyd. No. 7

### Post-Development Basin 2

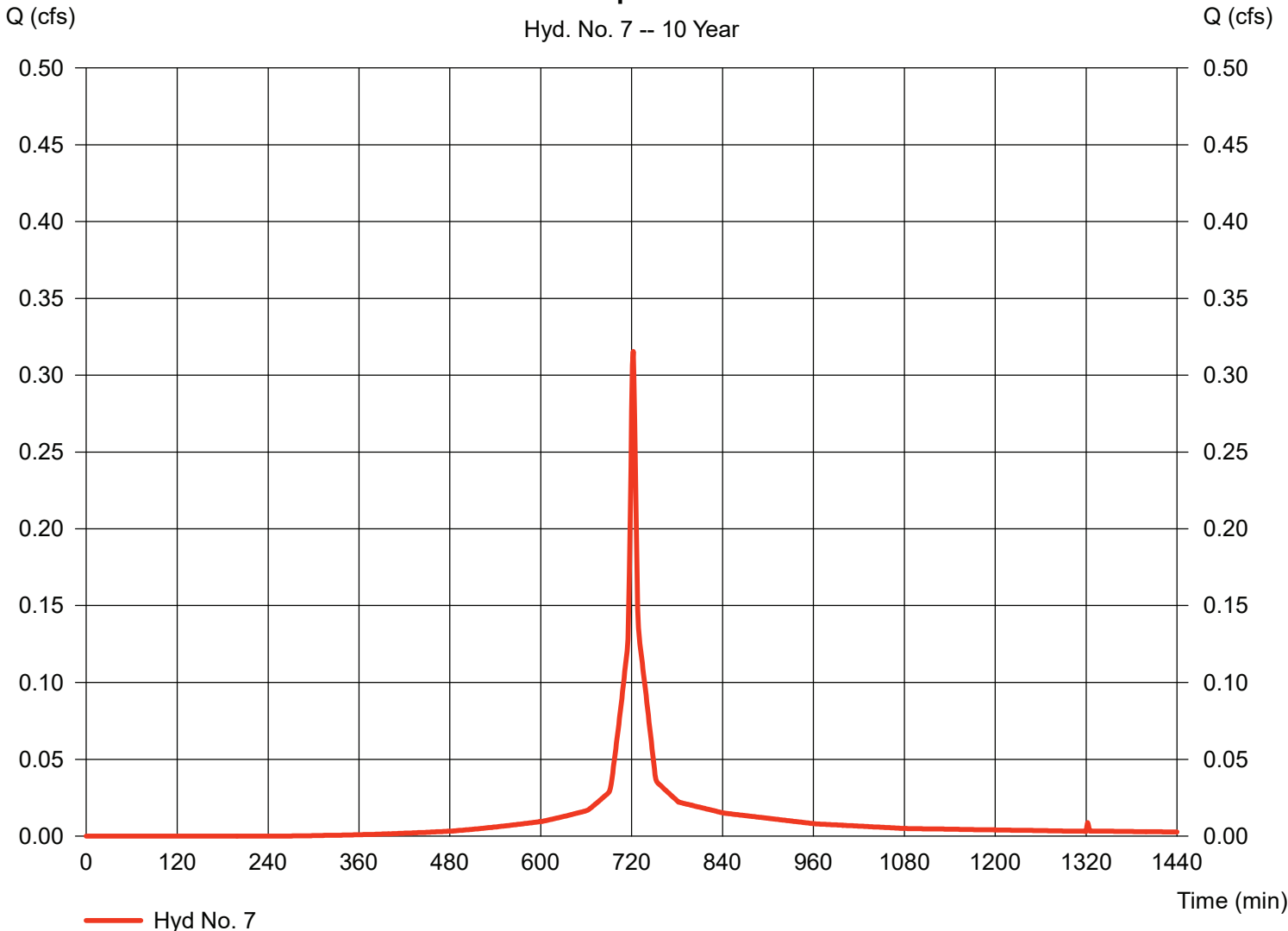
Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Time interval = 1 min  
Drainage area = 0.060 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.71 in  
Storm duration = 24 hrs

Peak discharge = 0.316 cfs  
Time to peak = 722 min  
Hyd. volume = 888 cuft  
Curve number = 88\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.11 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.037 \times 83) + (0.020 \times 98)] / 0.060$

### Post-Development Basin 2

Hyd. No. 7 -- 10 Year



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

## Hyd. No. 8

### Post-Development Basin 3

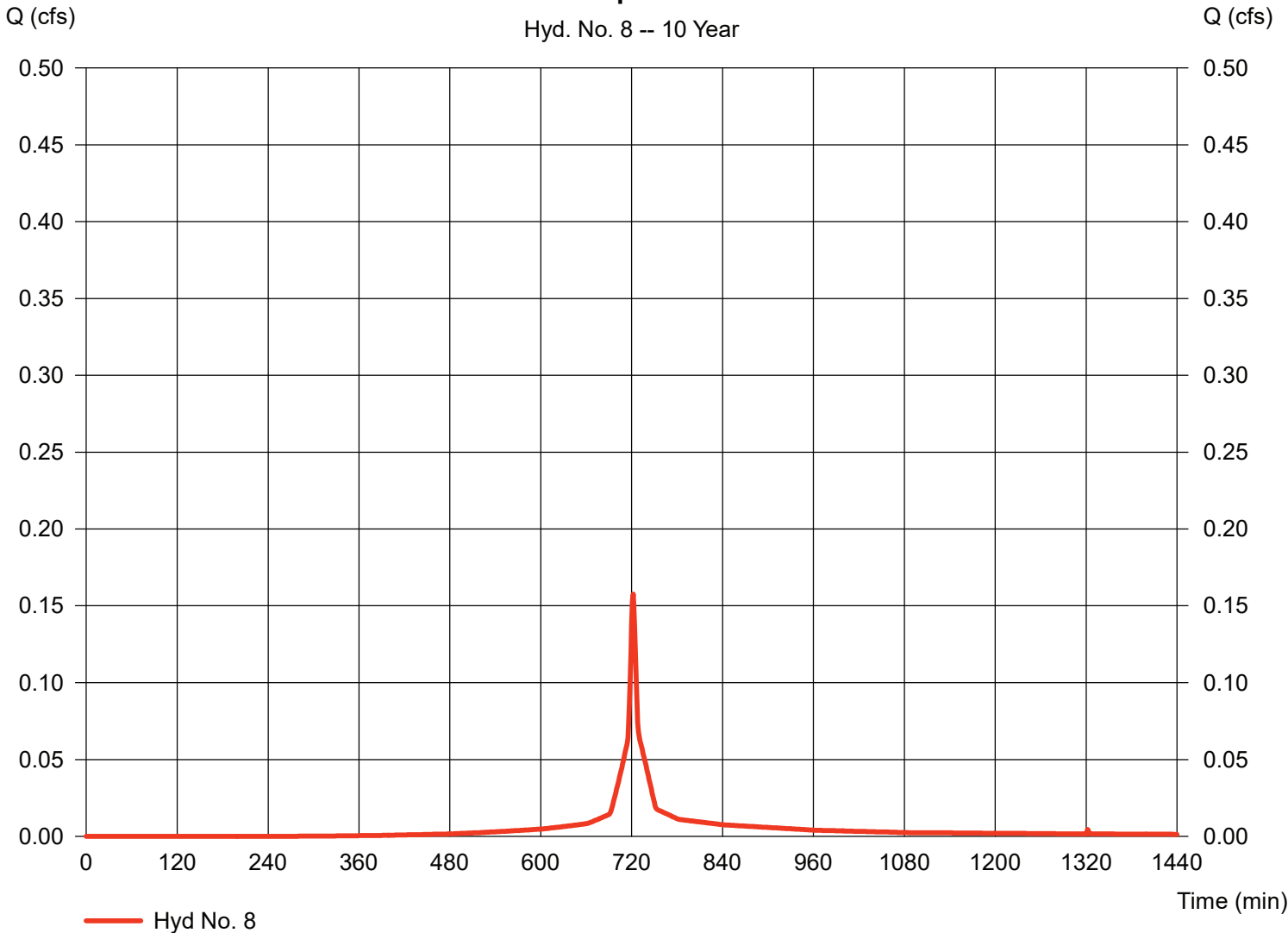
Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Time interval = 1 min  
Drainage area = 0.030 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.71 in  
Storm duration = 24 hrs

Peak discharge = 0.158 cfs  
Time to peak = 722 min  
Hyd. volume = 444 cuft  
Curve number = 88\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.007 \times 98) + (0.023 \times 85)] / 0.030$

### Post-Development Basin 3

Hyd. No. 8 -- 10 Year





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

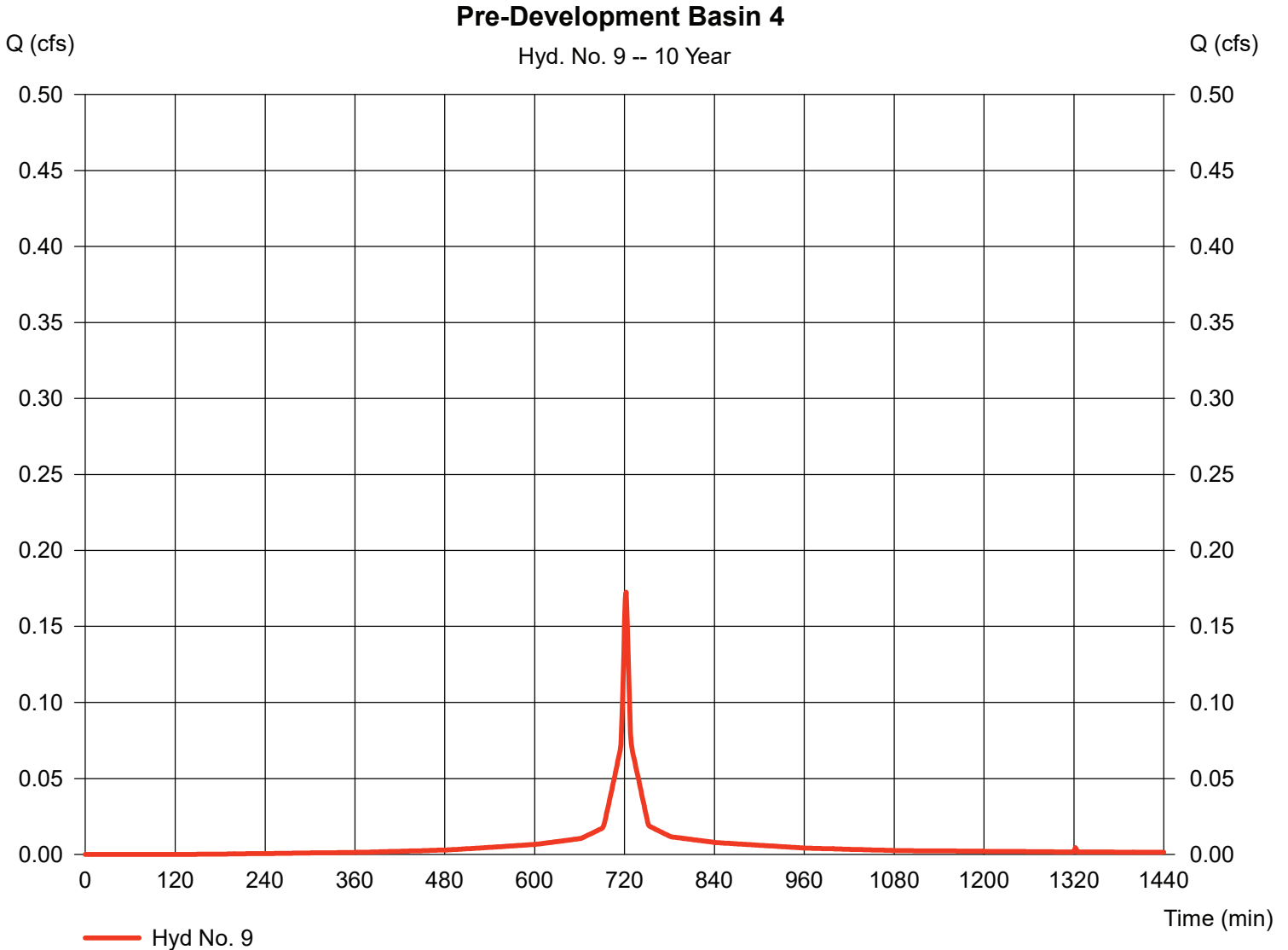
## Hyd. No. 9

### Pre-Development Basin 4

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Time interval = 1 min  
Drainage area = 0.030 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.71 in  
Storm duration = 24 hrs

Peak discharge = 0.173 cfs  
Time to peak = 722 min  
Hyd. volume = 511 cuft  
Curve number = 94\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.020 \times 98) + (0.010 \times 85)] / 0.030$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

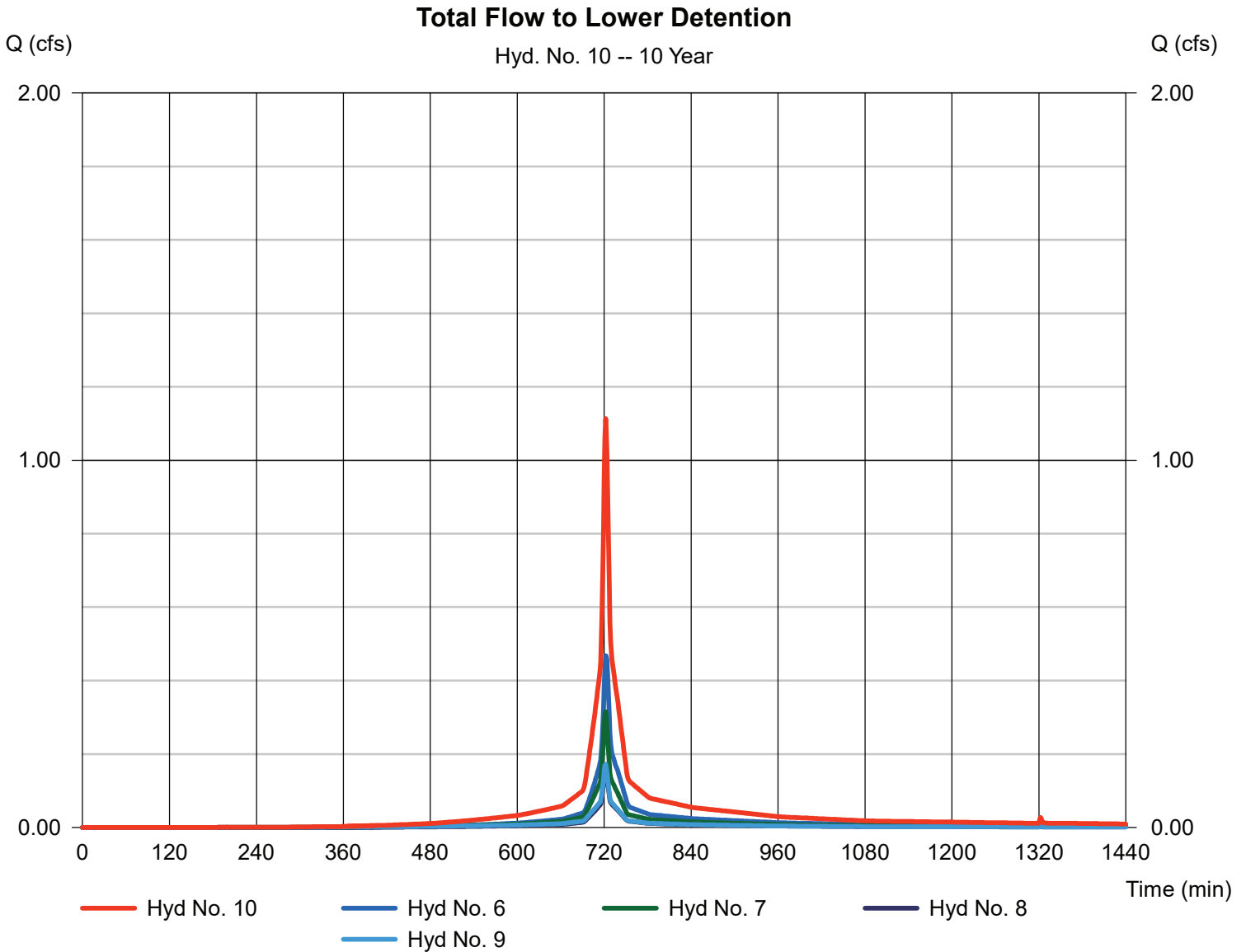
Monday, Dec 6, 2021

## Hyd. No. 10

Total Flow to Lower Detention

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Time interval = 1 min  
Inflow hyds. = 6, 7, 8, 9

Peak discharge = 1.113 cfs  
Time to peak = 722 min  
Hyd. volume = 3,179 cuft  
Contrib. drain. area = 0.120 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

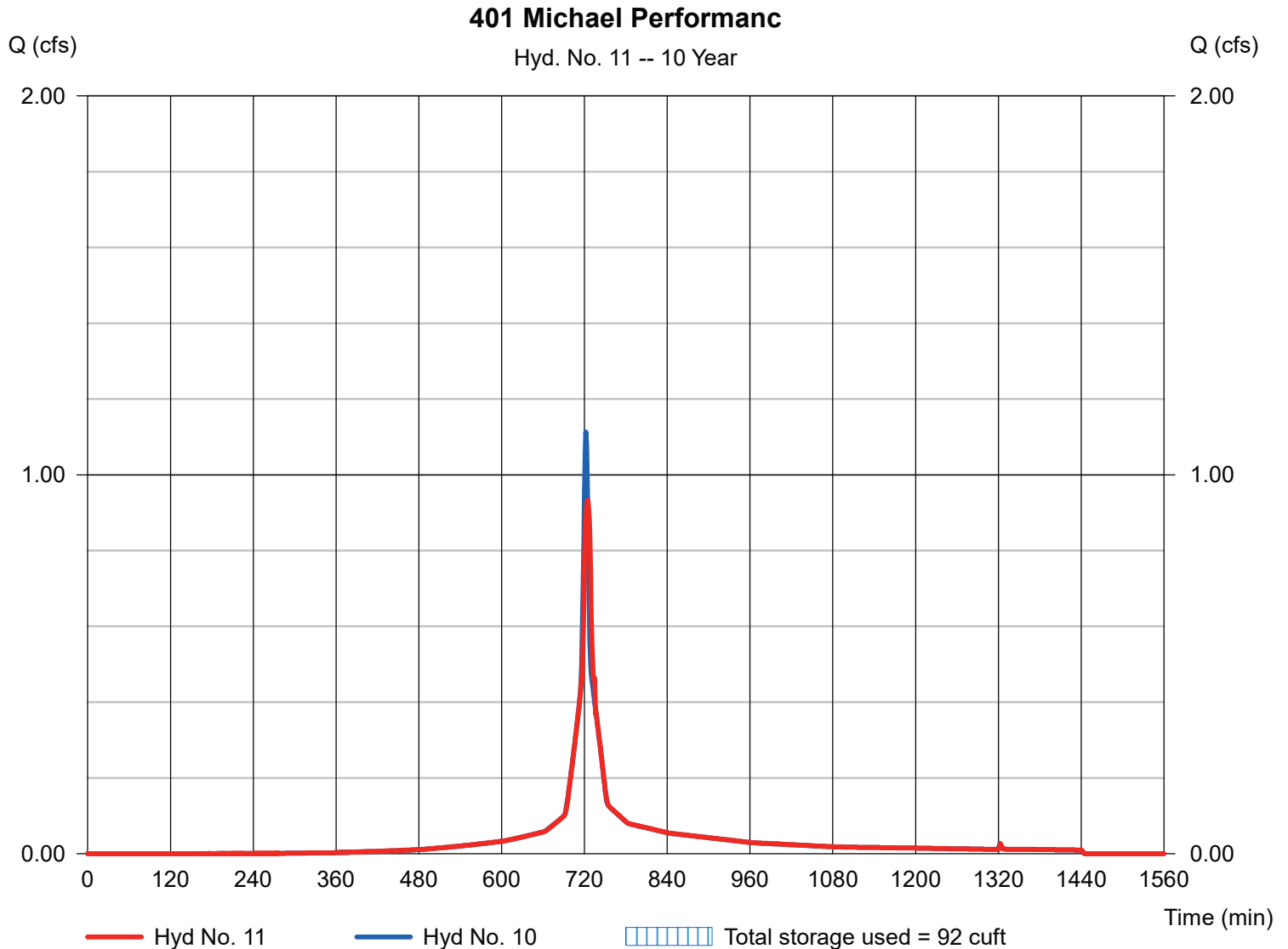
## Hyd. No. 11

401 Michael Performanc

Hydrograph type = Reservoir  
Storm frequency = 10 yrs  
Time interval = 1 min  
Inflow hyd. No. = 10 - Total Flow to Lower Detention  
Reservoir name = 401 Michael Detention

Peak discharge = 0.933 cfs  
Time to peak = 725 min  
Hyd. volume = 3,179 cuft  
Max. Elevation = 76.28 ft  
Max. Storage = 92 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

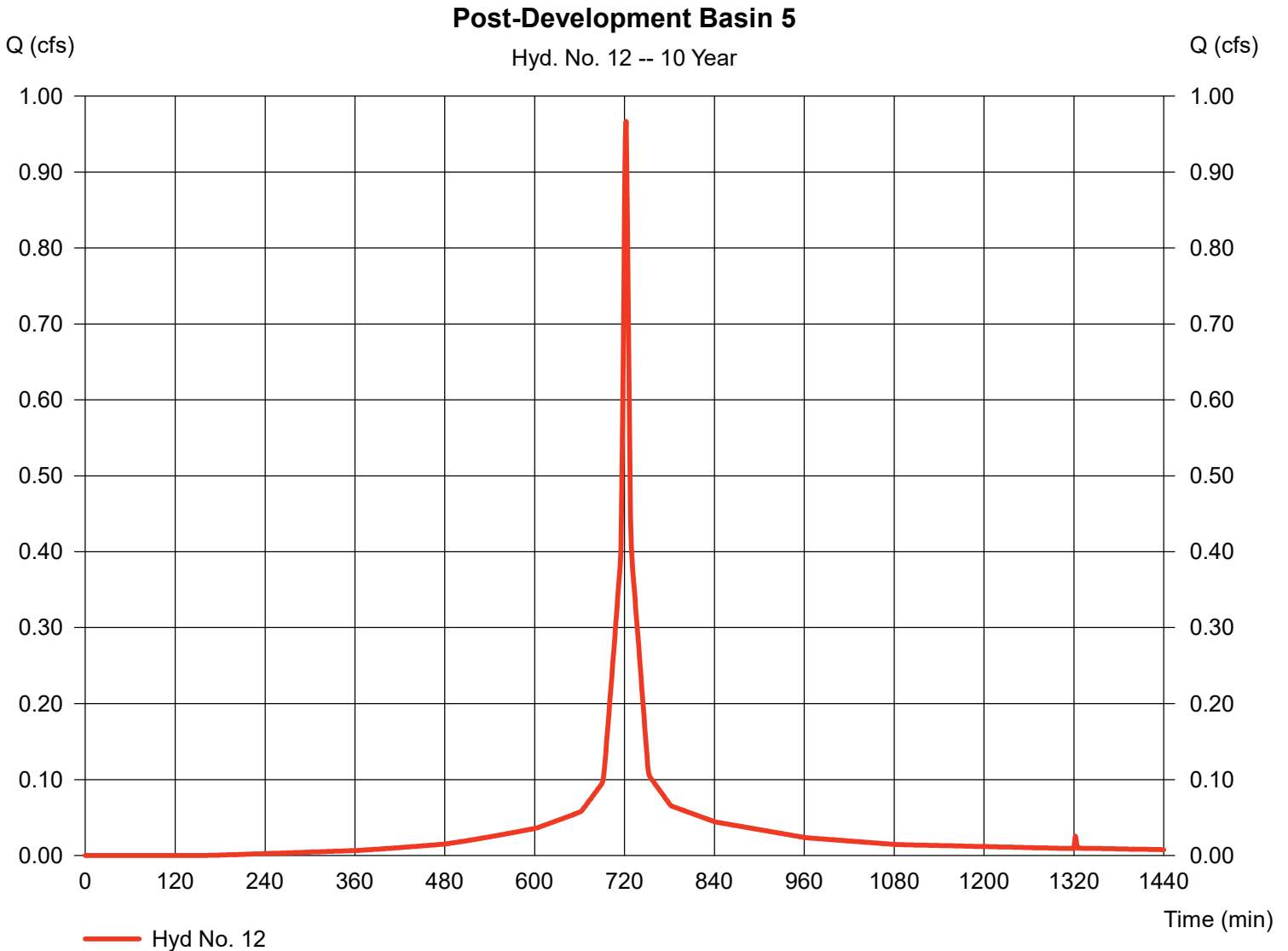
## Hyd. No. 12

### Post-Development Basin 5

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Time interval = 1 min  
Drainage area = 0.170 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.71 in  
Storm duration = 24 hrs

Peak discharge = 0.967 cfs  
Time to peak = 722 min  
Hyd. volume = 2,833 cuft  
Curve number = 93\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.90 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) = [(0.100 x 98) + (0.020 x 85) + (0.050 x 86)] / 0.170



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

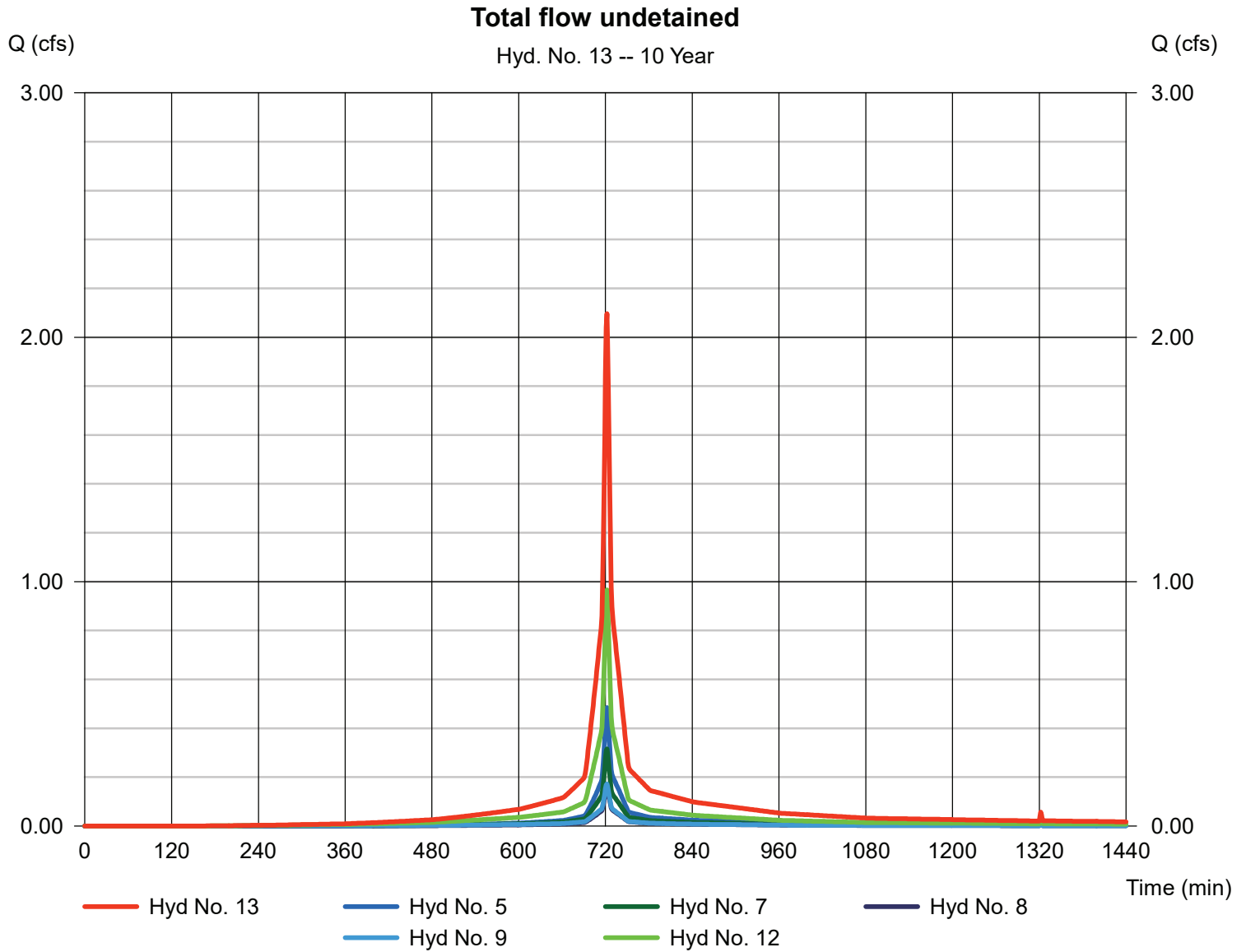
Monday, Dec 6, 2021

## Hyd. No. 13

Total flow undetained

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Time interval = 1 min  
Inflow hyds. = 5, 7, 8, 9, 12

Peak discharge = 2.097 cfs  
Time to peak = 722 min  
Hyd. volume = 6,012 cuft  
Contrib. drain. area = 0.390 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

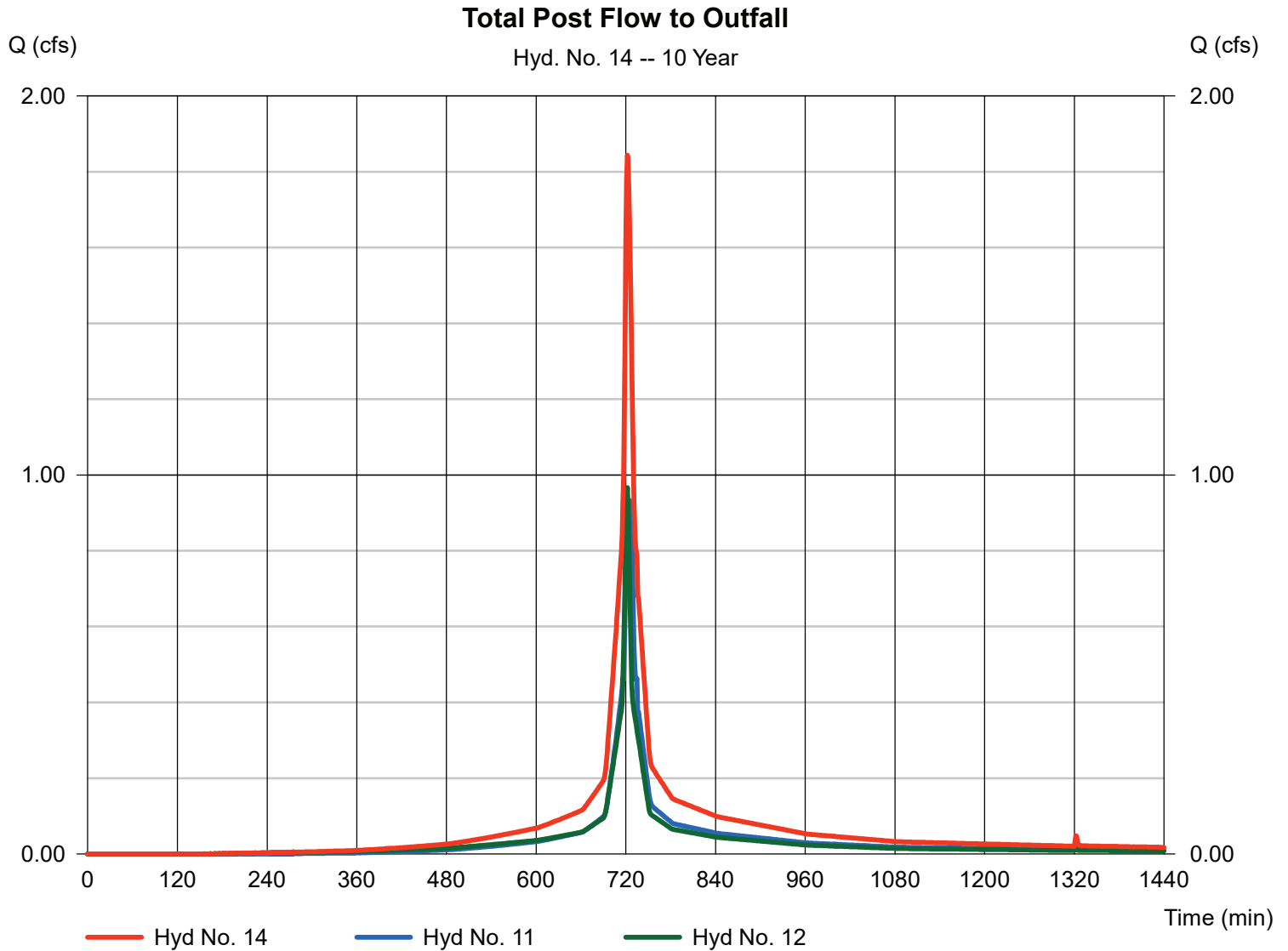
Monday, Dec 6, 2021

## Hyd. No. 14

Total Post Flow to Outfall

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Time interval = 1 min  
Inflow hyds. = 11, 12

Peak discharge = 1.844 cfs  
Time to peak = 722 min  
Hyd. volume = 6,012 cuft  
Contrib. drain. area = 0.170 ac





# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

| Hyd. No.             | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Hyd. volume (cuft)     | Inflow hyd(s)  | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph description                |
|----------------------|--------------------------|-----------------|---------------------|--------------------|------------------------|----------------|------------------------|-------------------------|---------------------------------------|
| 1                    | SCS Runoff               | 0.544           | 1                   | 722                | 1,516                  | ---            | ----                   | -----                   | Pre-Development Basin 1               |
| 2                    | SCS Runoff               | 1.948           | 1                   | 723                | 5,880                  | ---            | ----                   | -----                   | Pre-Development Basin 2               |
| 3                    | Combine                  | 2.468           | 1                   | 723                | 7,396                  | 1, 2           | ----                   | -----                   | Total Pre-Development Flow to Outfall |
| 5                    | SCS Runoff               | 0.605           | 1                   | 722                | 1,685                  | ---            | ----                   | -----                   | Post-Development Basin 1              |
| 6                    | Reservoir                | 0.516           | 1                   | 724                | 1,685                  | 5              | 86.39                  | 48.6                    | Upper Detention                       |
| 7                    | SCS Runoff               | 0.387           | 1                   | 722                | 1,102                  | ---            | ----                   | -----                   | Post-Development Basin 2              |
| 8                    | SCS Runoff               | 0.194           | 1                   | 722                | 551                    | ---            | ----                   | -----                   | Post-Development Basin 3              |
| 9                    | SCS Runoff               | 0.208           | 1                   | 722                | 622                    | ---            | ----                   | -----                   | Pre-Development Basin 4               |
| 10                   | Combine                  | 1.254           | 1                   | 722                | 3,960                  | 6, 7, 8, 9     | ----                   | -----                   | Total Flow to Lower Detention         |
| 11                   | Reservoir                | 1.045           | 1                   | 725                | 3,960                  | 10             | 76.60                  | 138                     | 401 Michael Performanc                |
| 12                   | SCS Runoff               | 1.166           | 1                   | 722                | 3,456                  | ---            | ----                   | -----                   | Post-Development Basin 5              |
| 13                   | Combine                  | 2.559           | 1                   | 722                | 7,416                  | 5, 7, 8, 9, 12 | ----                   | -----                   | Total flow undetained                 |
| 14                   | Combine                  | 2.125           | 1                   | 722                | 7,416                  | 11, 12,        | ----                   | -----                   | Total Post Flow to Outfall            |
| 401MichaelBasins.gpw |                          |                 |                     |                    | Return Period: 25 Year |                |                        | Monday, Dec 6, 2021     |                                       |

# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

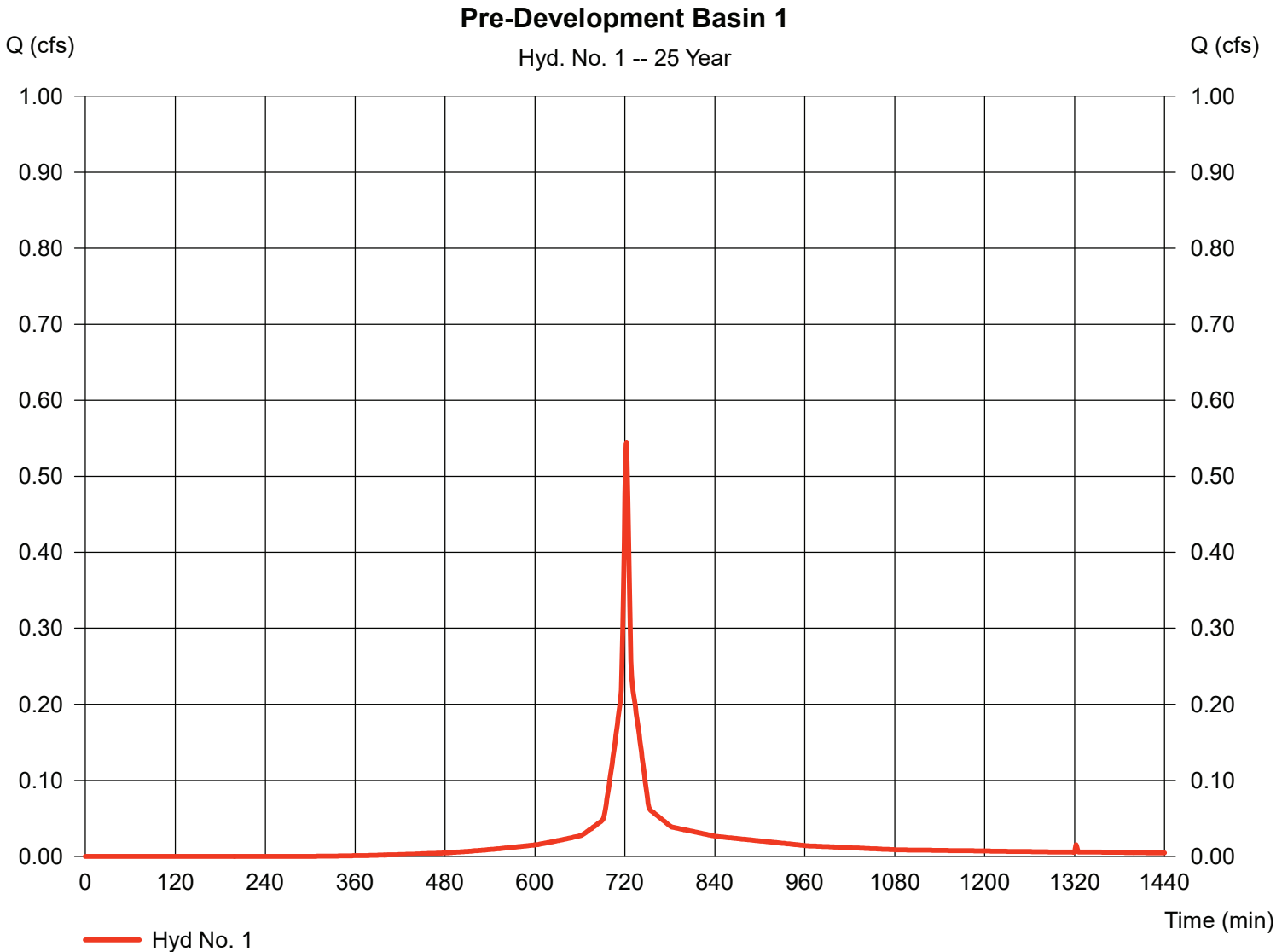
## Hyd. No. 1

### Pre-Development Basin 1

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Time interval = 1 min  
Drainage area = 0.090 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.80 in  
Storm duration = 24 hrs

Peak discharge = 0.544 cfs  
Time to peak = 722 min  
Hyd. volume = 1,516 cuft  
Curve number = 84\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.020 \times 85) + (0.070 \times 84)] / 0.090$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

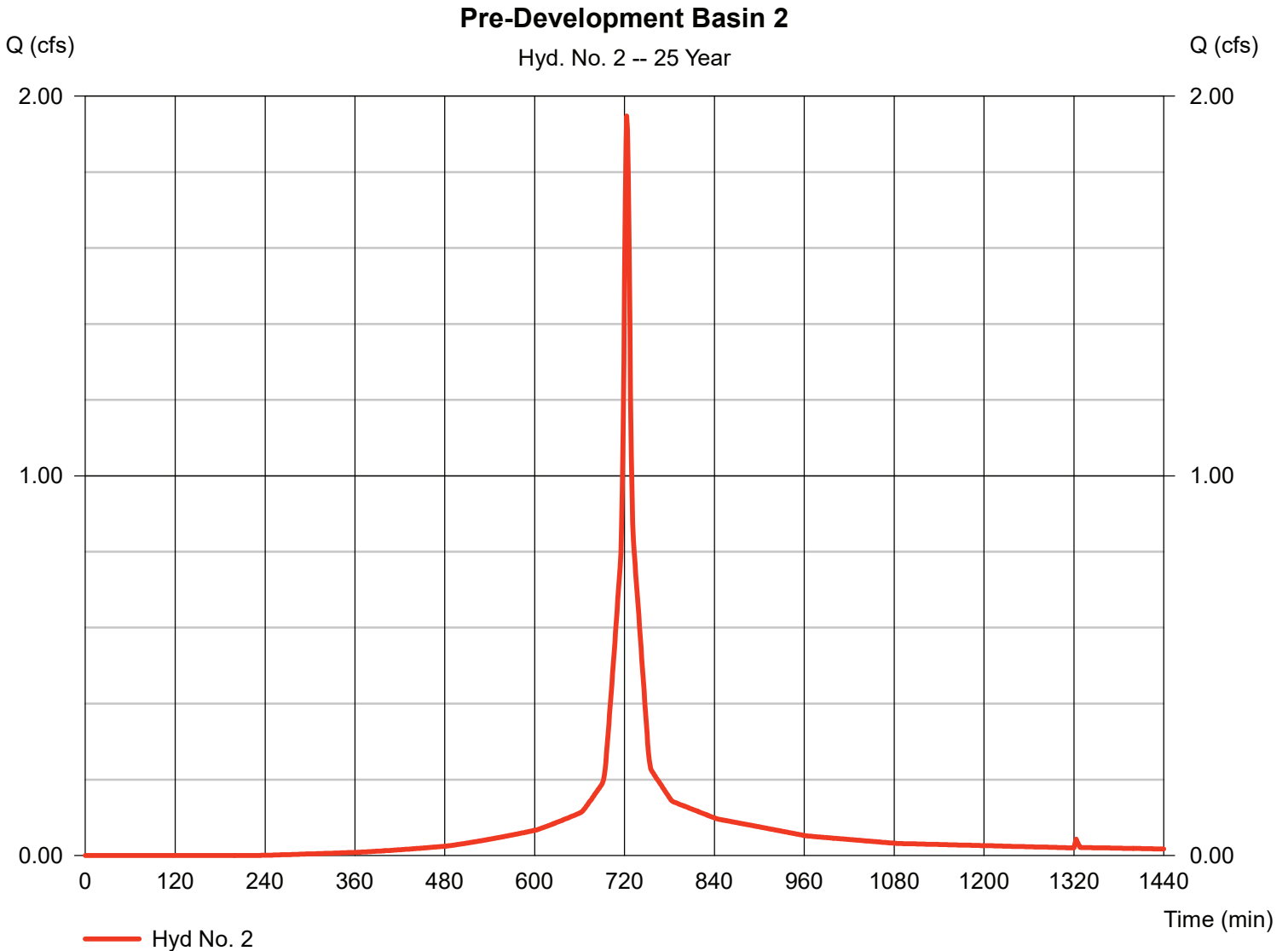
## Hyd. No. 2

### Pre-Development Basin 2

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Time interval = 1 min  
Drainage area = 0.300 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.80 in  
Storm duration = 24 hrs

Peak discharge = 1.948 cfs  
Time to peak = 723 min  
Hyd. volume = 5,880 cuft  
Curve number = 88\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 3.70 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) = [(0.054 x 83) + (0.123 x 86) + (0.057 x 98) + (0.064 x 85)] / 0.300



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

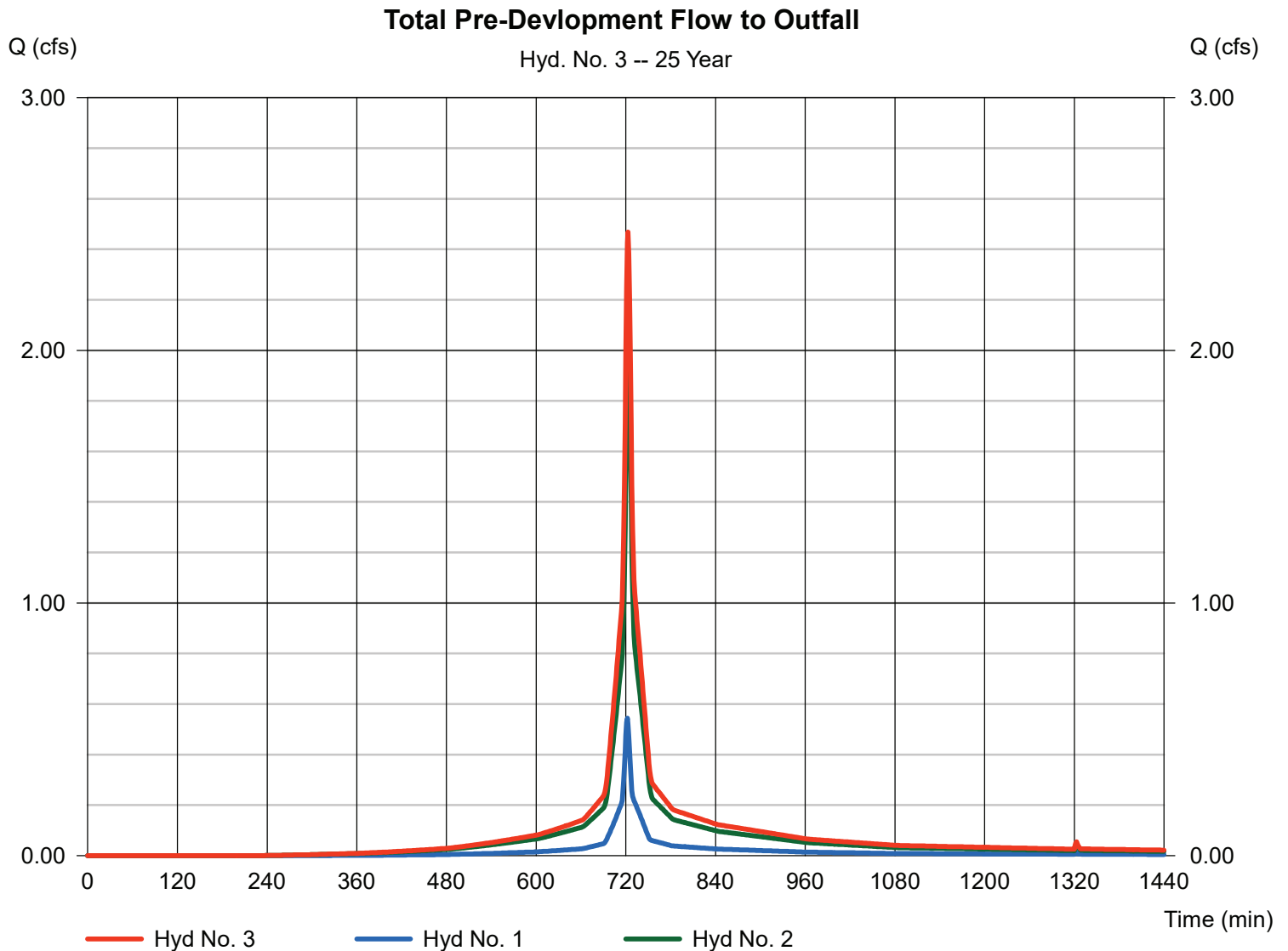
Monday, Dec 6, 2021

## Hyd. No. 3

Total Pre-Development Flow to Outfall

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Time interval = 1 min  
Inflow hyds. = 1, 2

Peak discharge = 2.468 cfs  
Time to peak = 723 min  
Hyd. volume = 7,396 cuft  
Contrib. drain. area = 0.390 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

## Hyd. No. 5

### Post-Development Basin 1

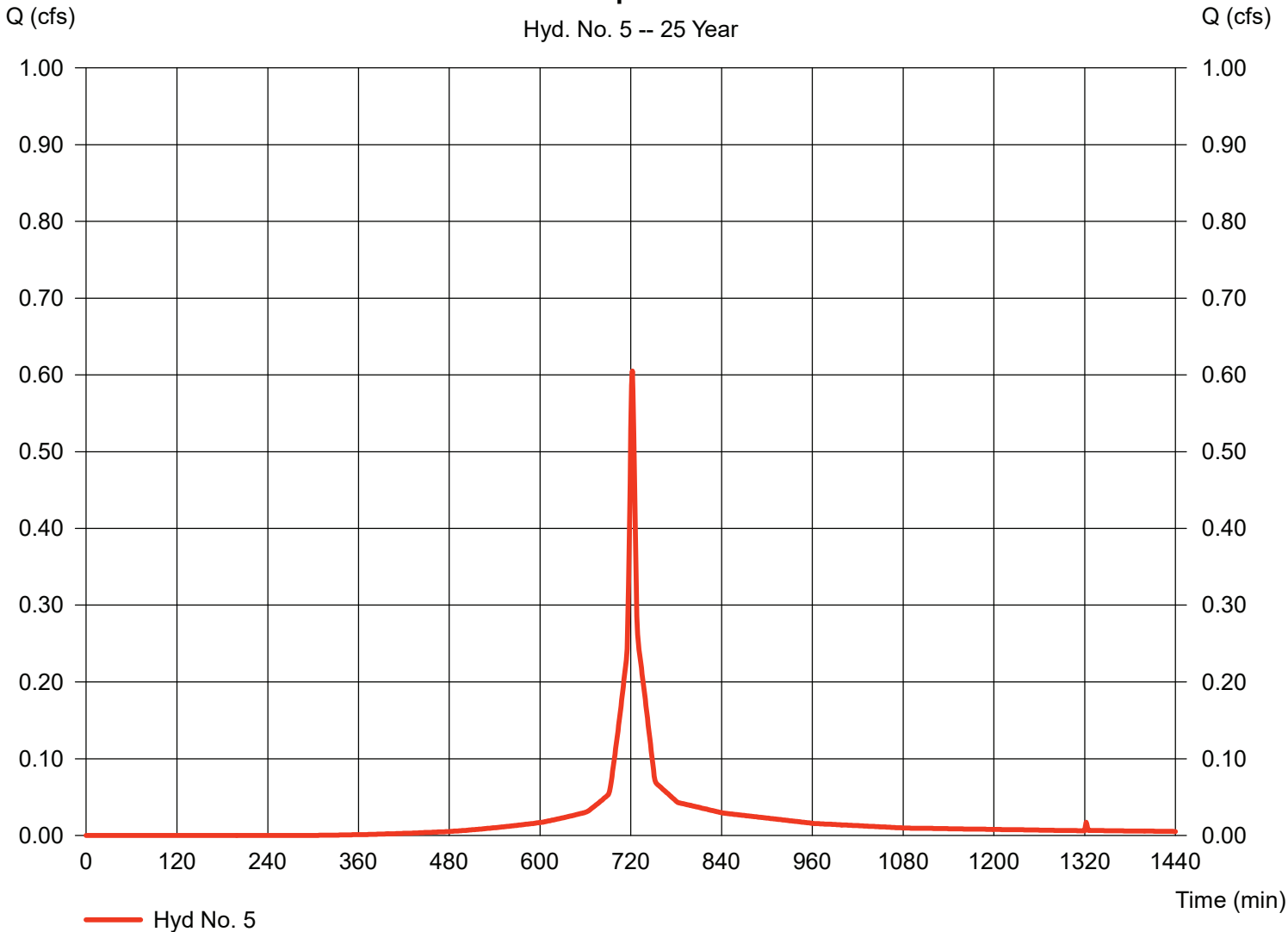
Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Time interval = 1 min  
Drainage area = 0.100 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.80 in  
Storm duration = 24 hrs

Peak discharge = 0.605 cfs  
Time to peak = 722 min  
Hyd. volume = 1,685 cuft  
Curve number = 84\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) = [(0.020 x 98) + (0.020 x 83) + (0.060 x 80)] / 0.100

### Post-Development Basin 1

Hyd. No. 5 -- 25 Year



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

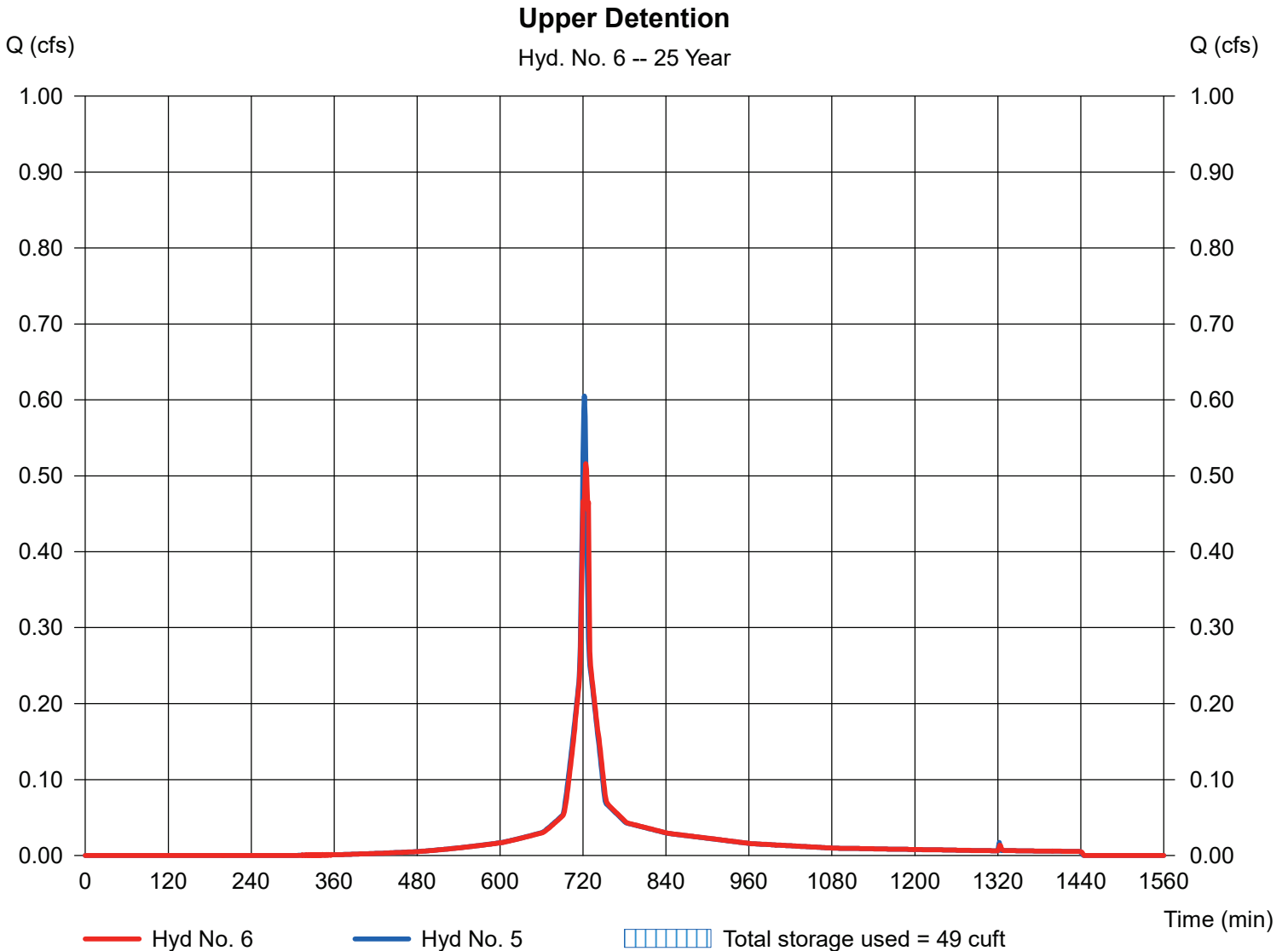
## Hyd. No. 6

Upper Detention

Hydrograph type = Reservoir  
Storm frequency = 25 yrs  
Time interval = 1 min  
Inflow hyd. No. = 5 - Post-Development Basin 1  
Reservoir name = 401 Upper Detention

Peak discharge = 0.516 cfs  
Time to peak = 724 min  
Hyd. volume = 1,685 cuft  
Max. Elevation = 86.39 ft  
Max. Storage = 49 cuft

Storage Indication method used.





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

## Hyd. No. 7

### Post-Development Basin 2

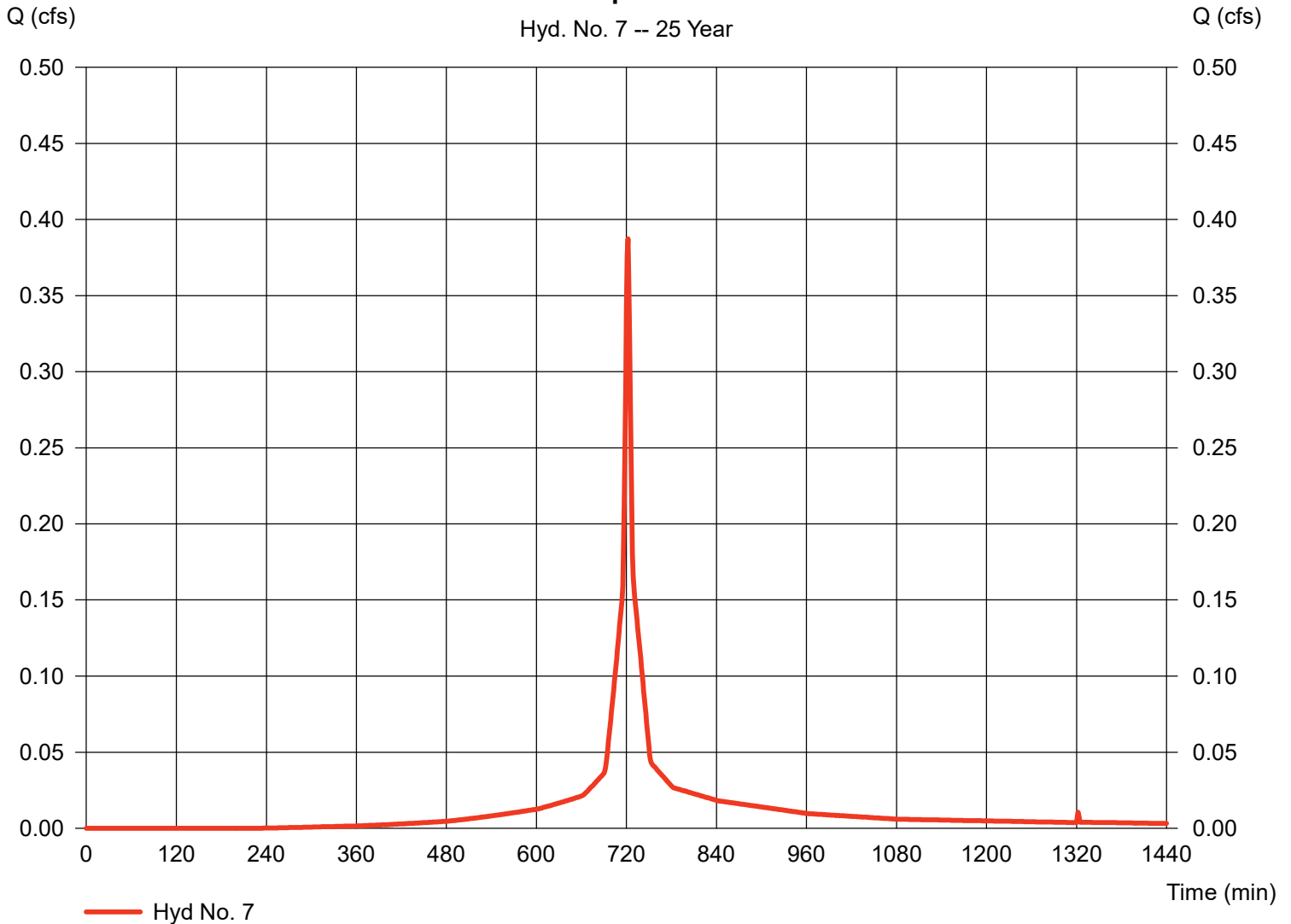
Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Time interval = 1 min  
Drainage area = 0.060 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.80 in  
Storm duration = 24 hrs

Peak discharge = 0.387 cfs  
Time to peak = 722 min  
Hyd. volume = 1,102 cuft  
Curve number = 88\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.11 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.037 \times 83) + (0.020 \times 98)] / 0.060$

### Post-Development Basin 2

Hyd. No. 7 -- 25 Year



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

## Hyd. No. 8

### Post-Development Basin 3

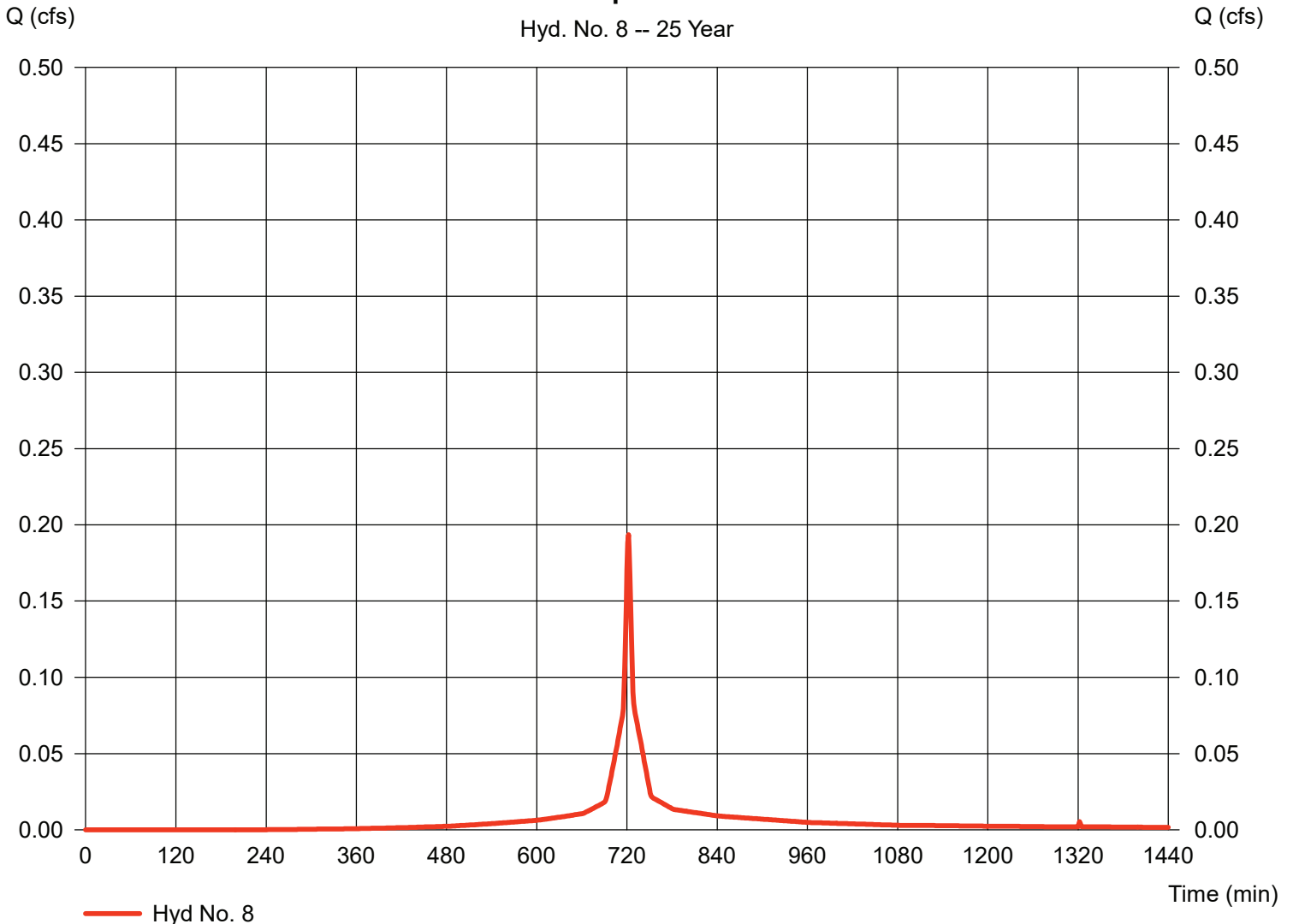
Hydrograph type = SCS Runoff  
 Storm frequency = 25 yrs  
 Time interval = 1 min  
 Drainage area = 0.030 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 6.80 in  
 Storm duration = 24 hrs

Peak discharge = 0.194 cfs  
 Time to peak = 722 min  
 Hyd. volume = 551 cuft  
 Curve number = 88\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 2.00 min  
 Distribution = Type III  
 Shape factor = 484

\* Composite (Area/CN) = [(0.007 x 98) + (0.023 x 85)] / 0.030

### Post-Development Basin 3

Hyd. No. 8 -- 25 Year



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

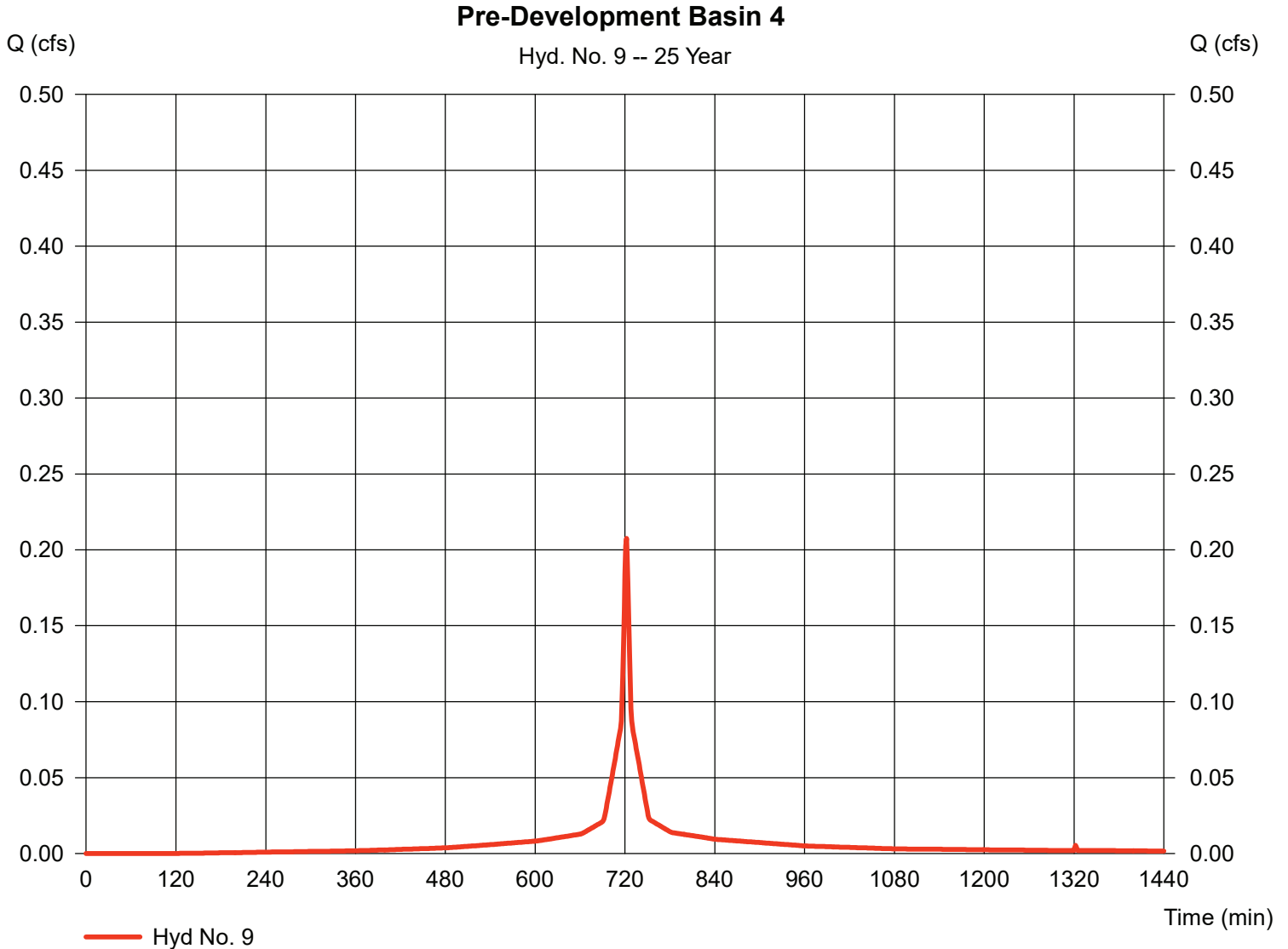
## Hyd. No. 9

### Pre-Development Basin 4

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Time interval = 1 min  
Drainage area = 0.030 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.80 in  
Storm duration = 24 hrs

Peak discharge = 0.208 cfs  
Time to peak = 722 min  
Hyd. volume = 622 cuft  
Curve number = 94\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.020 \times 98) + (0.010 \times 85)] / 0.030$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

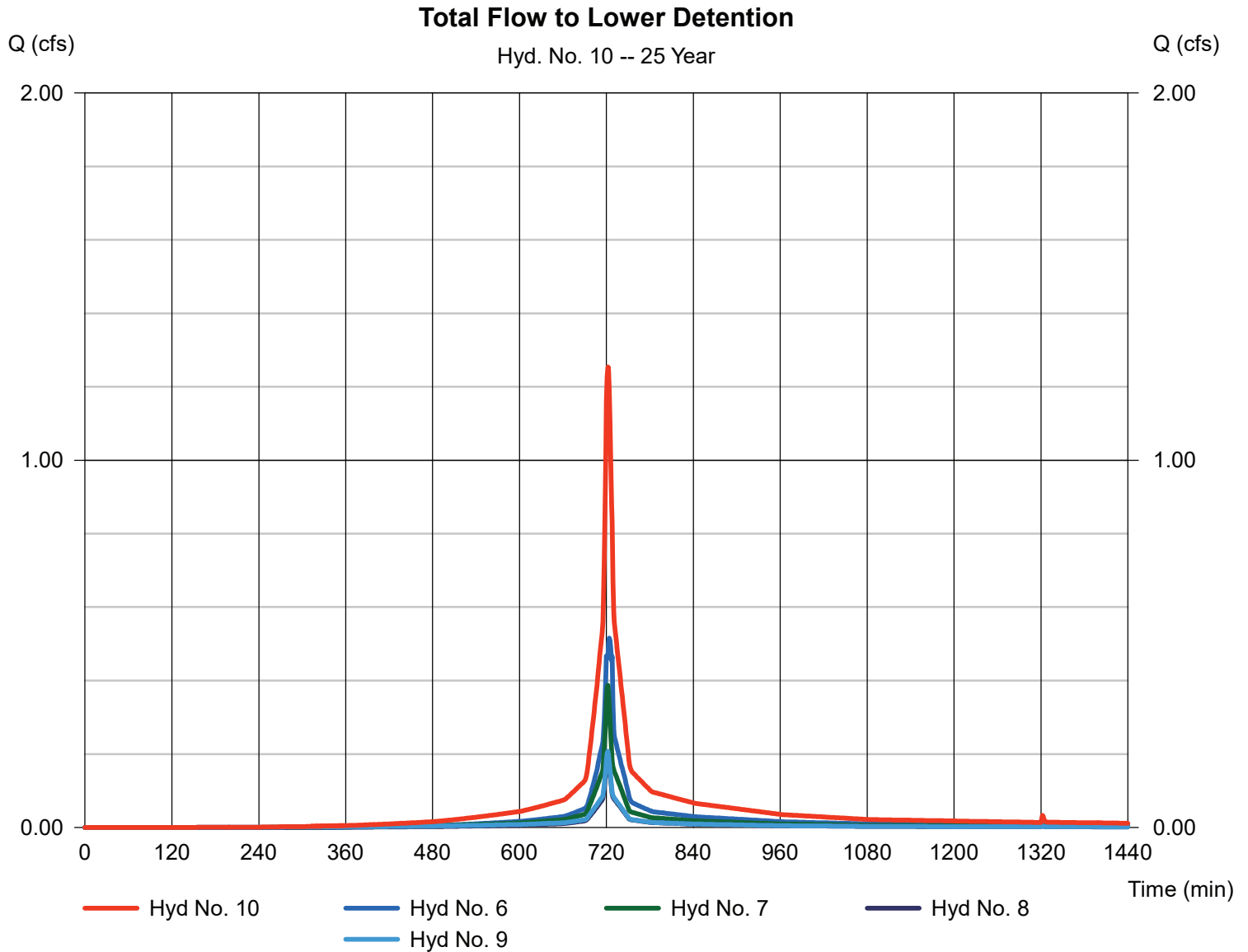
Monday, Dec 6, 2021

## Hyd. No. 10

Total Flow to Lower Detention

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Time interval = 1 min  
Inflow hyds. = 6, 7, 8, 9

Peak discharge = 1.254 cfs  
Time to peak = 722 min  
Hyd. volume = 3,960 cuft  
Contrib. drain. area = 0.120 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

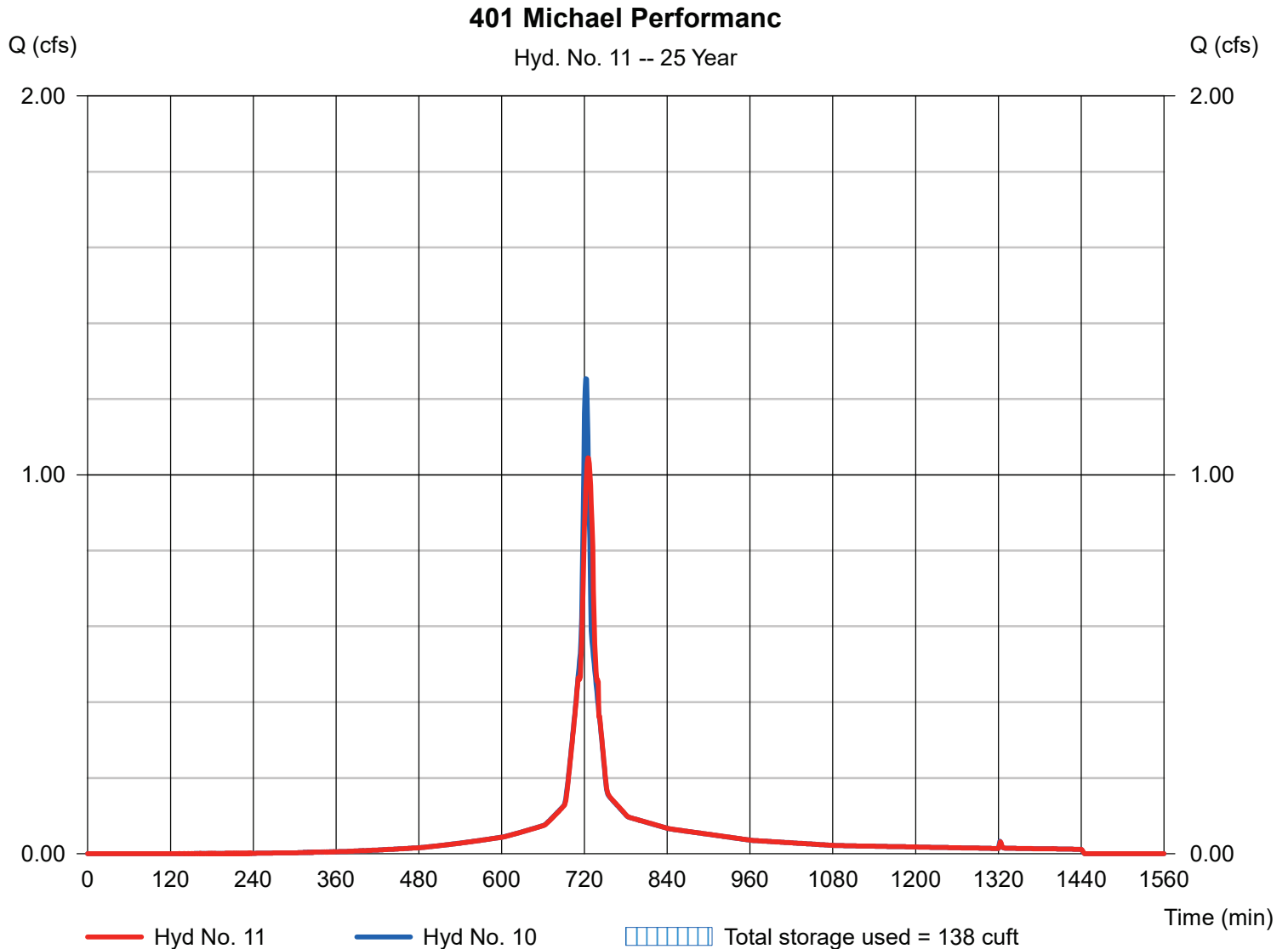
## Hyd. No. 11

401 Michael Performanc

Hydrograph type = Reservoir  
Storm frequency = 25 yrs  
Time interval = 1 min  
Inflow hyd. No. = 10 - Total Flow to Lower Detention  
Reservoir name = 401 Michael Detention

Peak discharge = 1.045 cfs  
Time to peak = 725 min  
Hyd. volume = 3,960 cuft  
Max. Elevation = 76.60 ft  
Max. Storage = 138 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

## Hyd. No. 12

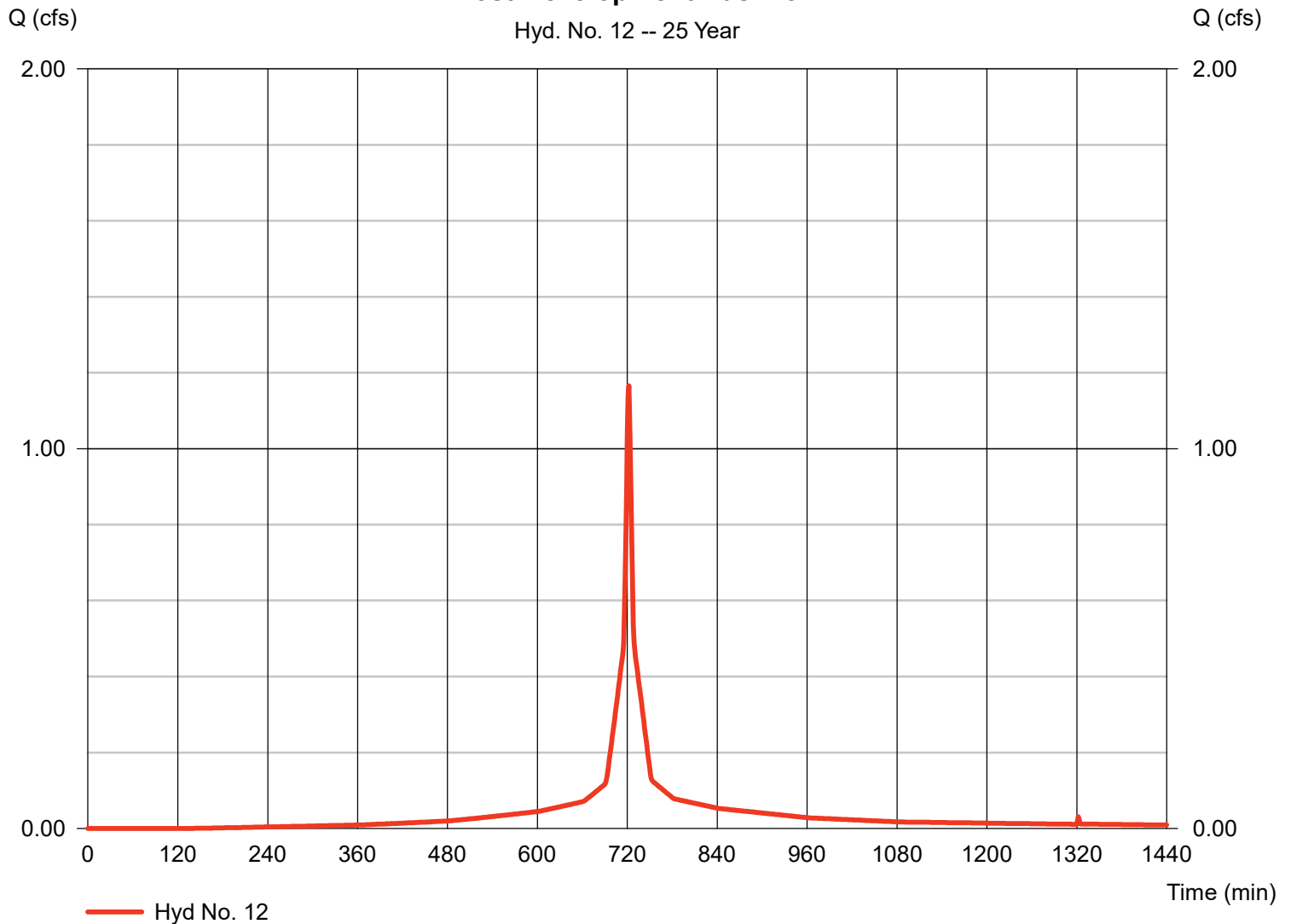
### Post-Development Basin 5

Hydrograph type = SCS Runoff  
 Storm frequency = 25 yrs  
 Time interval = 1 min  
 Drainage area = 0.170 ac  
 Basin Slope = 0.0 %  
 Tc method = USER  
 Total precip. = 6.80 in  
 Storm duration = 24 hrs

Peak discharge = 1.166 cfs  
 Time to peak = 722 min  
 Hyd. volume = 3,456 cuft  
 Curve number = 93\*  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 2.90 min  
 Distribution = Type III  
 Shape factor = 484

\* Composite (Area/CN) = [(0.100 x 98) + (0.020 x 85) + (0.050 x 86)] / 0.170

### Post-Development Basin 5





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

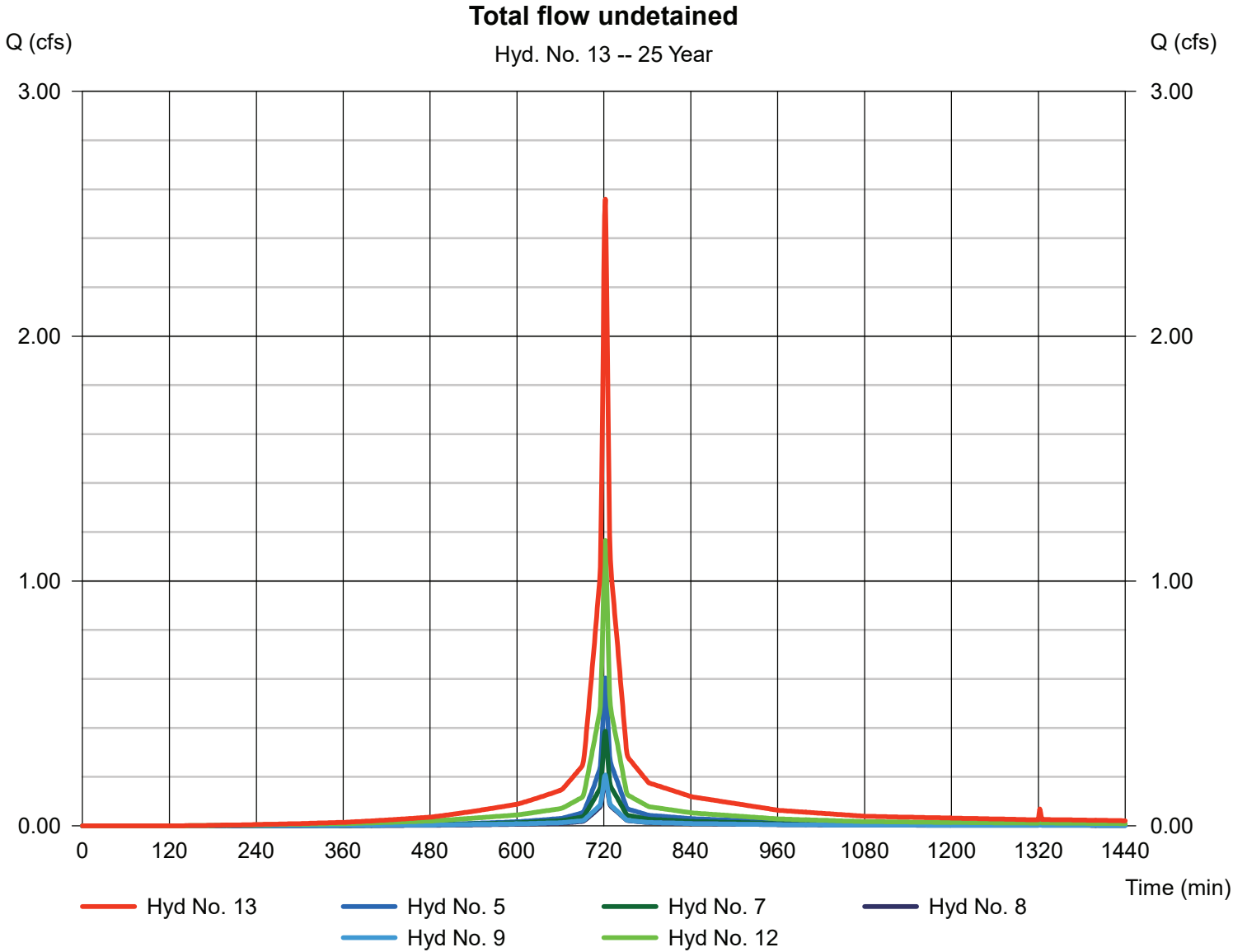
Monday, Dec 6, 2021

## Hyd. No. 13

Total flow undetained

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Time interval = 1 min  
Inflow hyds. = 5, 7, 8, 9, 12

Peak discharge = 2.559 cfs  
Time to peak = 722 min  
Hyd. volume = 7,416 cuft  
Contrib. drain. area = 0.390 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

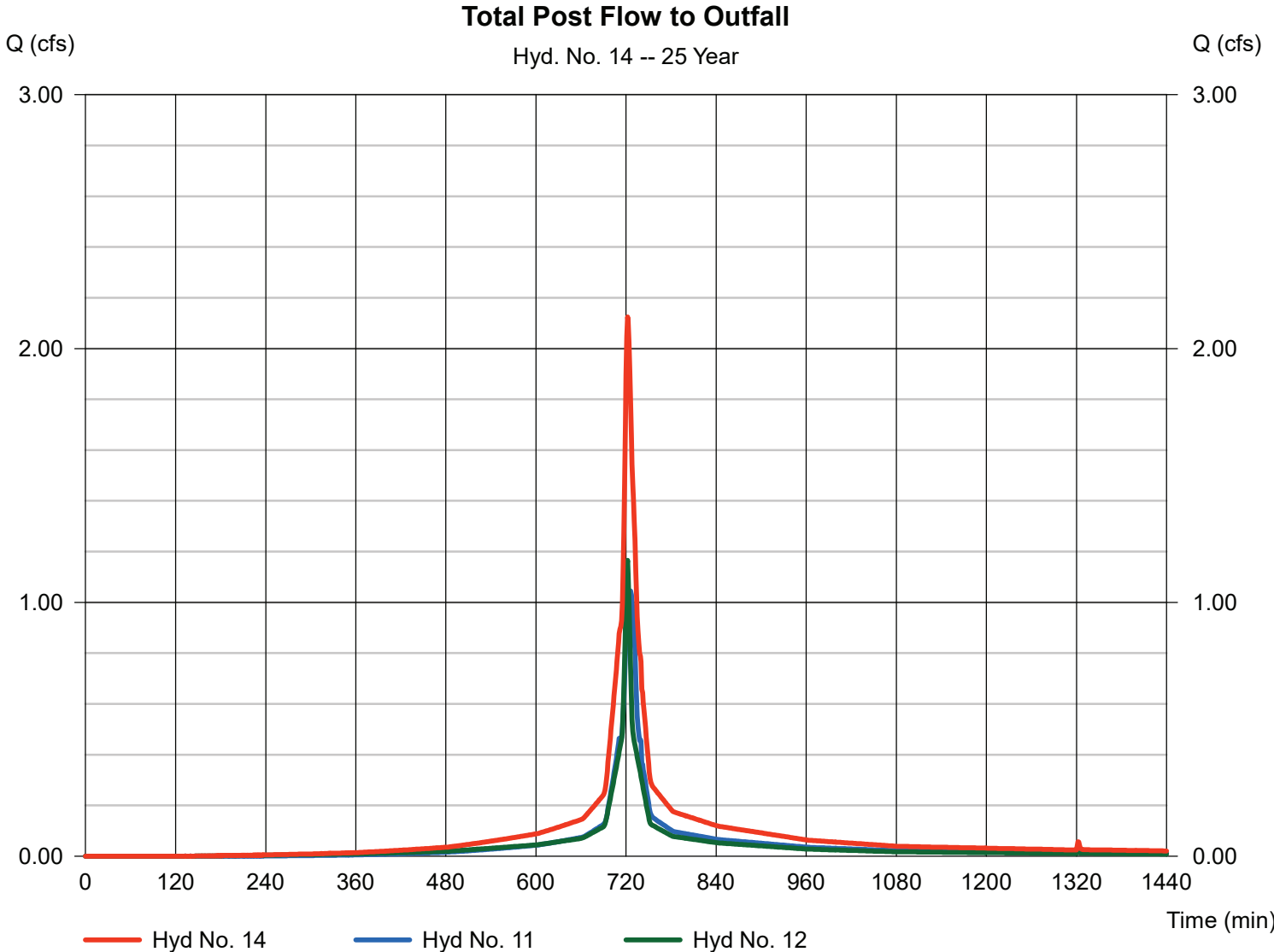
Monday, Dec 6, 2021

## Hyd. No. 14

Total Post Flow to Outfall

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Time interval = 1 min  
Inflow hyds. = 11, 12

Peak discharge = 2.125 cfs  
Time to peak = 722 min  
Hyd. volume = 7,416 cuft  
Contrib. drain. area = 0.170 ac



# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

| Hyd. No.             | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Hyd. volume (cuft)     | Inflow hyd(s)  | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph description                |
|----------------------|--------------------------|-----------------|---------------------|--------------------|------------------------|----------------|------------------------|-------------------------|---------------------------------------|
| 1                    | SCS Runoff               | 0.633           | 1                   | 722                | 1,776                  | ---            | ----                   | -----                   | Pre-Development Basin 1               |
| 2                    | SCS Runoff               | 2.242           | 1                   | 723                | 6,823                  | ---            | ----                   | -----                   | Pre-Development Basin 2               |
| 3                    | Combine                  | 2.846           | 1                   | 723                | 8,599                  | 1, 2           | ----                   | -----                   | Total Pre-Development Flow to Outfall |
| 5                    | SCS Runoff               | 0.703           | 1                   | 722                | 1,973                  | ---            | ----                   | -----                   | Post-Development Basin 1              |
| 6                    | Reservoir                | 0.595           | 1                   | 724                | 1,973                  | 5              | 86.52                  | 64.6                    | Upper Detention                       |
| 7                    | SCS Runoff               | 0.446           | 1                   | 722                | 1,279                  | ---            | ----                   | -----                   | Post-Development Basin 2              |
| 8                    | SCS Runoff               | 0.223           | 1                   | 722                | 640                    | ---            | ----                   | -----                   | Post-Development Basin 3              |
| 9                    | SCS Runoff               | 0.236           | 1                   | 722                | 712                    | ---            | ----                   | -----                   | Pre-Development Basin 4               |
| 10                   | Combine                  | 1.448           | 1                   | 722                | 4,604                  | 6, 7, 8, 9     | ----                   | -----                   | Total Flow to Lower Detention         |
| 11                   | Reservoir                | 1.153           | 1                   | 726                | 4,604                  | 10             | 76.94                  | 187                     | 401 Michael Performanc                |
| 12                   | SCS Runoff               | 1.327           | 1                   | 722                | 3,966                  | ---            | ----                   | -----                   | Post-Development Basin 5              |
| 13                   | Combine                  | 2.935           | 1                   | 722                | 8,570                  | 5, 7, 8, 9, 12 | ----                   | -----                   | Total flow undetained                 |
| 14                   | Combine                  | 2.356           | 1                   | 722                | 8,570                  | 11, 12,        | ----                   | -----                   | Total Post Flow to Outfall            |
| 401MichaelBasins.gpw |                          |                 |                     |                    | Return Period: 50 Year |                |                        | Monday, Dec 6, 2021     |                                       |

# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

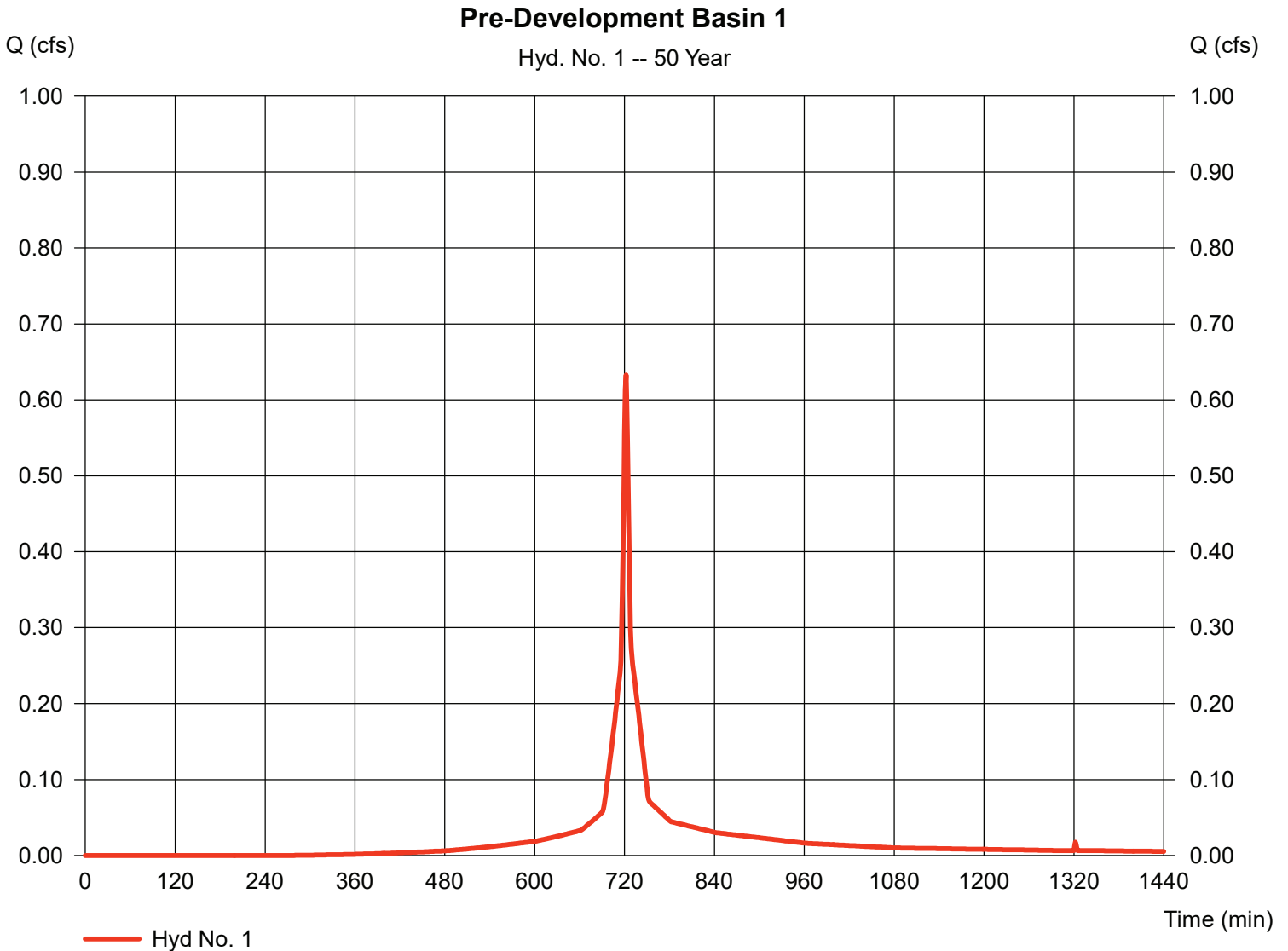
## Hyd. No. 1

### Pre-Development Basin 1

Hydrograph type = SCS Runoff  
Storm frequency = 50 yrs  
Time interval = 1 min  
Drainage area = 0.090 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.69 in  
Storm duration = 24 hrs

Peak discharge = 0.633 cfs  
Time to peak = 722 min  
Hyd. volume = 1,776 cuft  
Curve number = 84\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.020 \times 85) + (0.070 \times 84)] / 0.090$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

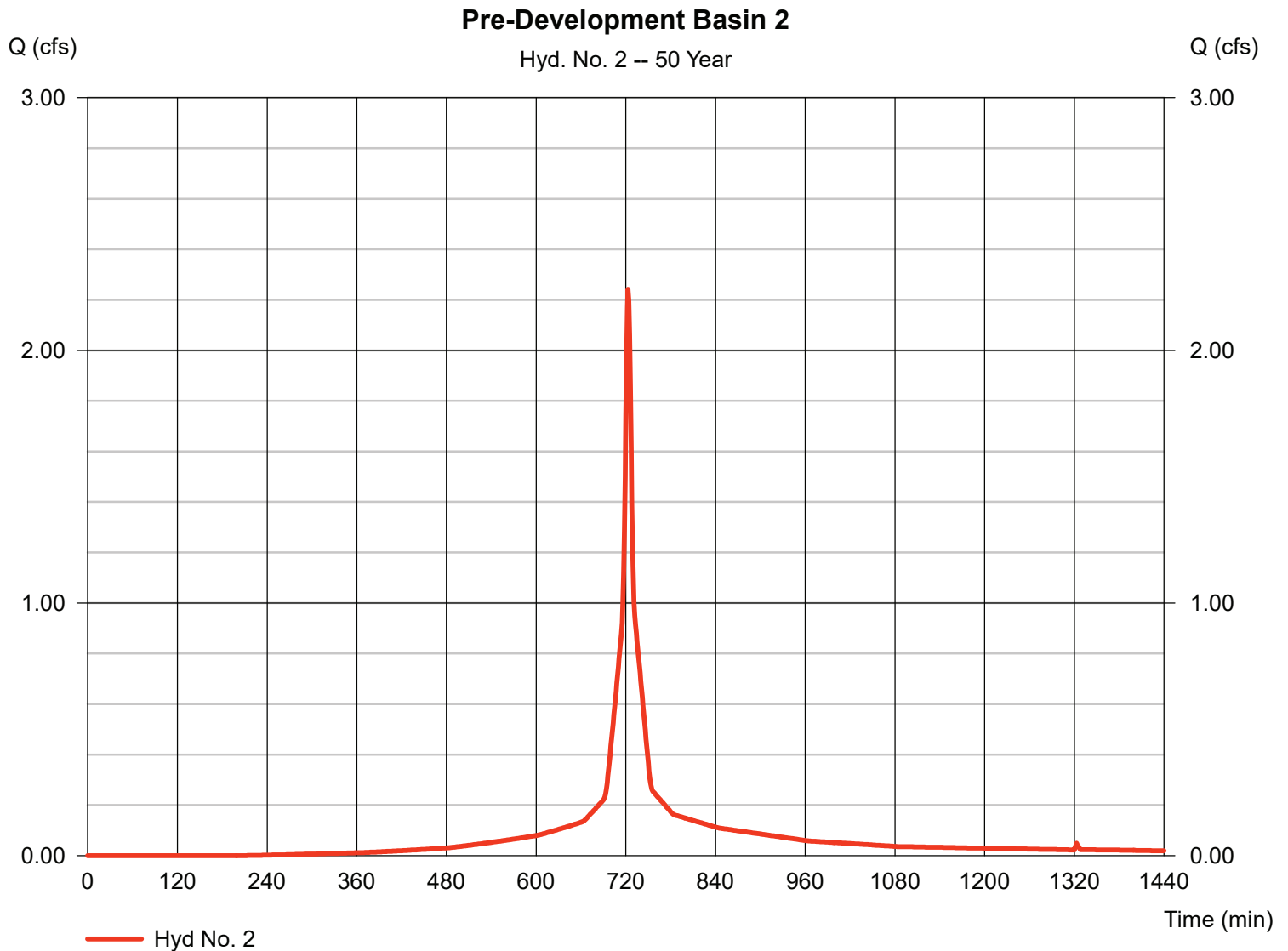
## Hyd. No. 2

### Pre-Development Basin 2

Hydrograph type = SCS Runoff  
Storm frequency = 50 yrs  
Time interval = 1 min  
Drainage area = 0.300 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.69 in  
Storm duration = 24 hrs

Peak discharge = 2.242 cfs  
Time to peak = 723 min  
Hyd. volume = 6,823 cuft  
Curve number = 88\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 3.70 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.054 \times 83) + (0.123 \times 86) + (0.057 \times 98) + (0.064 \times 85)] / 0.300$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

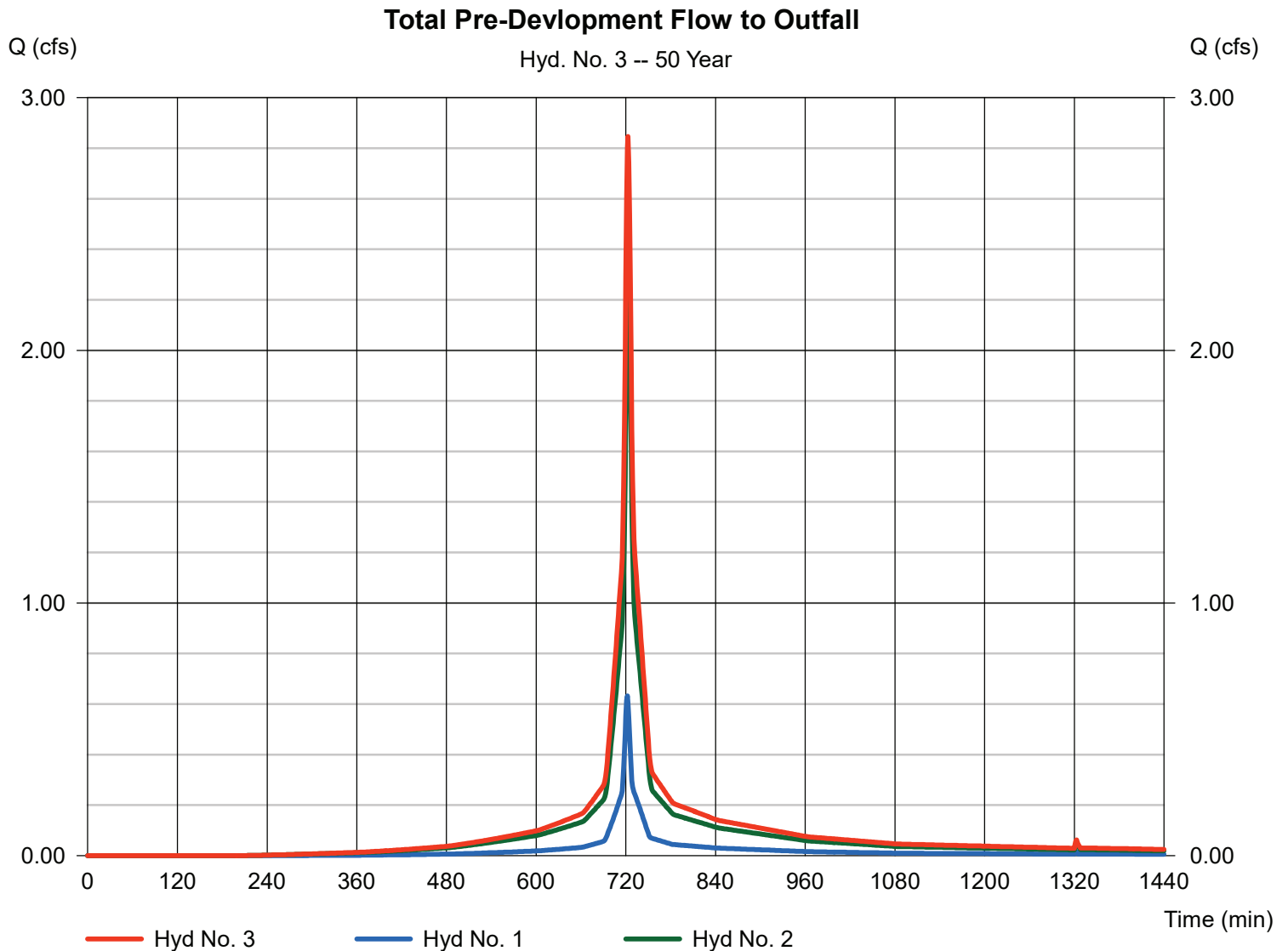
Monday, Dec 6, 2021

## Hyd. No. 3

Total Pre-Development Flow to Outfall

Hydrograph type = Combine  
Storm frequency = 50 yrs  
Time interval = 1 min  
Inflow hyds. = 1, 2

Peak discharge = 2.846 cfs  
Time to peak = 723 min  
Hyd. volume = 8,599 cuft  
Contrib. drain. area = 0.390 ac





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

## Hyd. No. 5

### Post-Development Basin 1

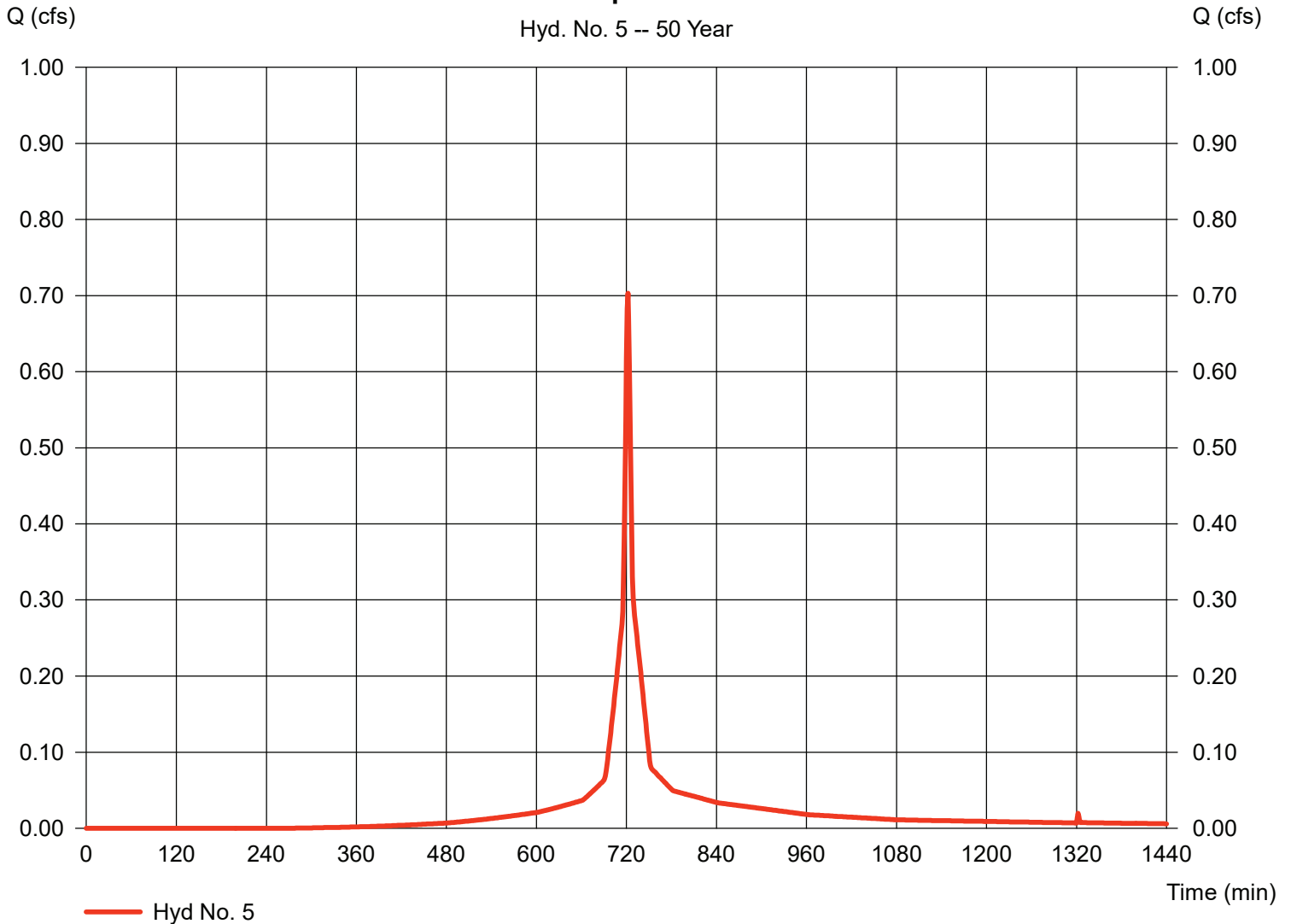
Hydrograph type = SCS Runoff  
Storm frequency = 50 yrs  
Time interval = 1 min  
Drainage area = 0.100 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.69 in  
Storm duration = 24 hrs

Peak discharge = 0.703 cfs  
Time to peak = 722 min  
Hyd. volume = 1,973 cuft  
Curve number = 84\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) = [(0.020 x 98) + (0.020 x 83) + (0.060 x 80)] / 0.100

### Post-Development Basin 1

Hyd. No. 5 -- 50 Year



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

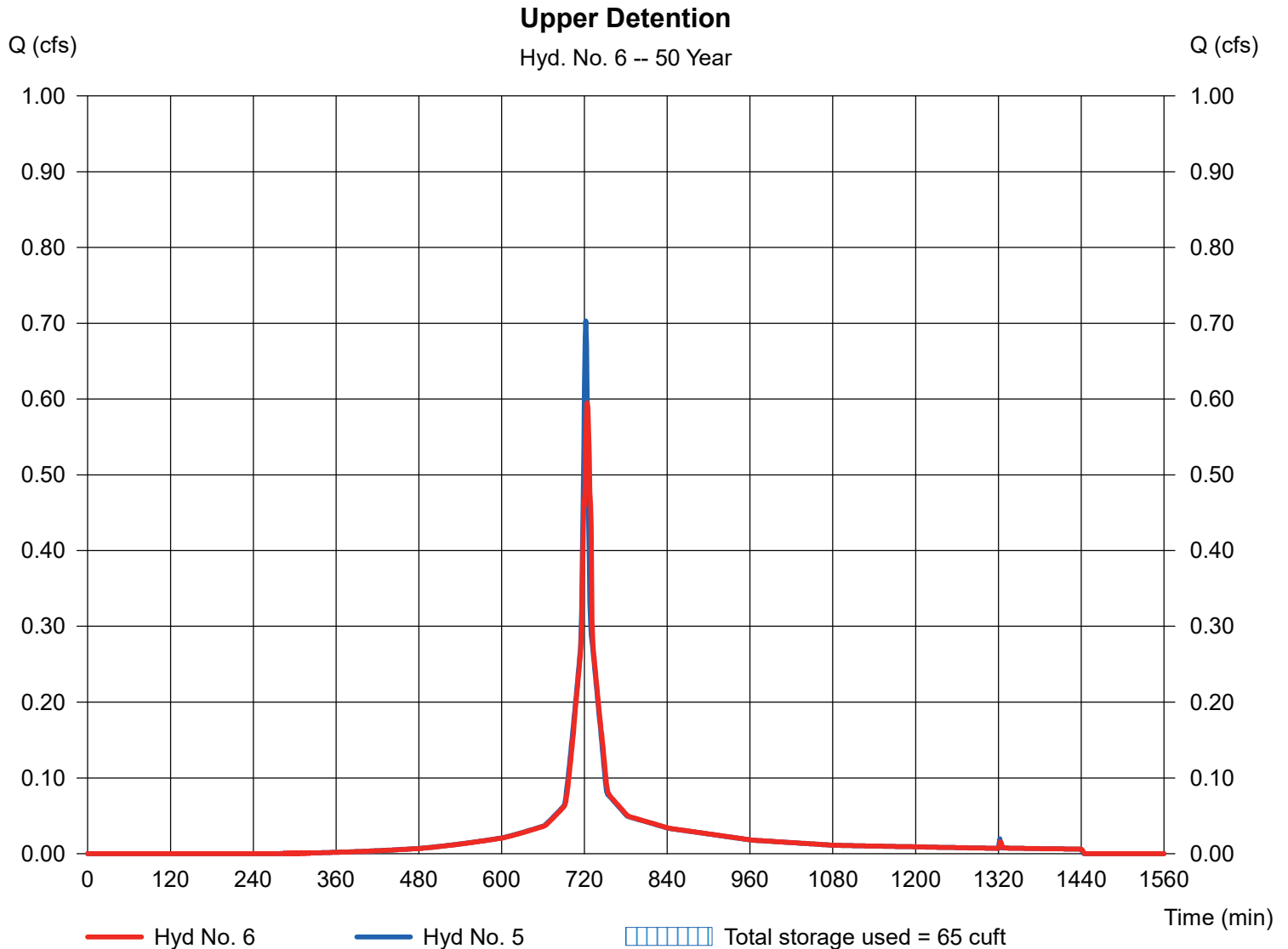
## Hyd. No. 6

Upper Detention

Hydrograph type = Reservoir  
Storm frequency = 50 yrs  
Time interval = 1 min  
Inflow hyd. No. = 5 - Post-Development Basin 1  
Reservoir name = 401 Upper Detention

Peak discharge = 0.595 cfs  
Time to peak = 724 min  
Hyd. volume = 1,973 cuft  
Max. Elevation = 86.52 ft  
Max. Storage = 65 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

## Hyd. No. 7

### Post-Development Basin 2

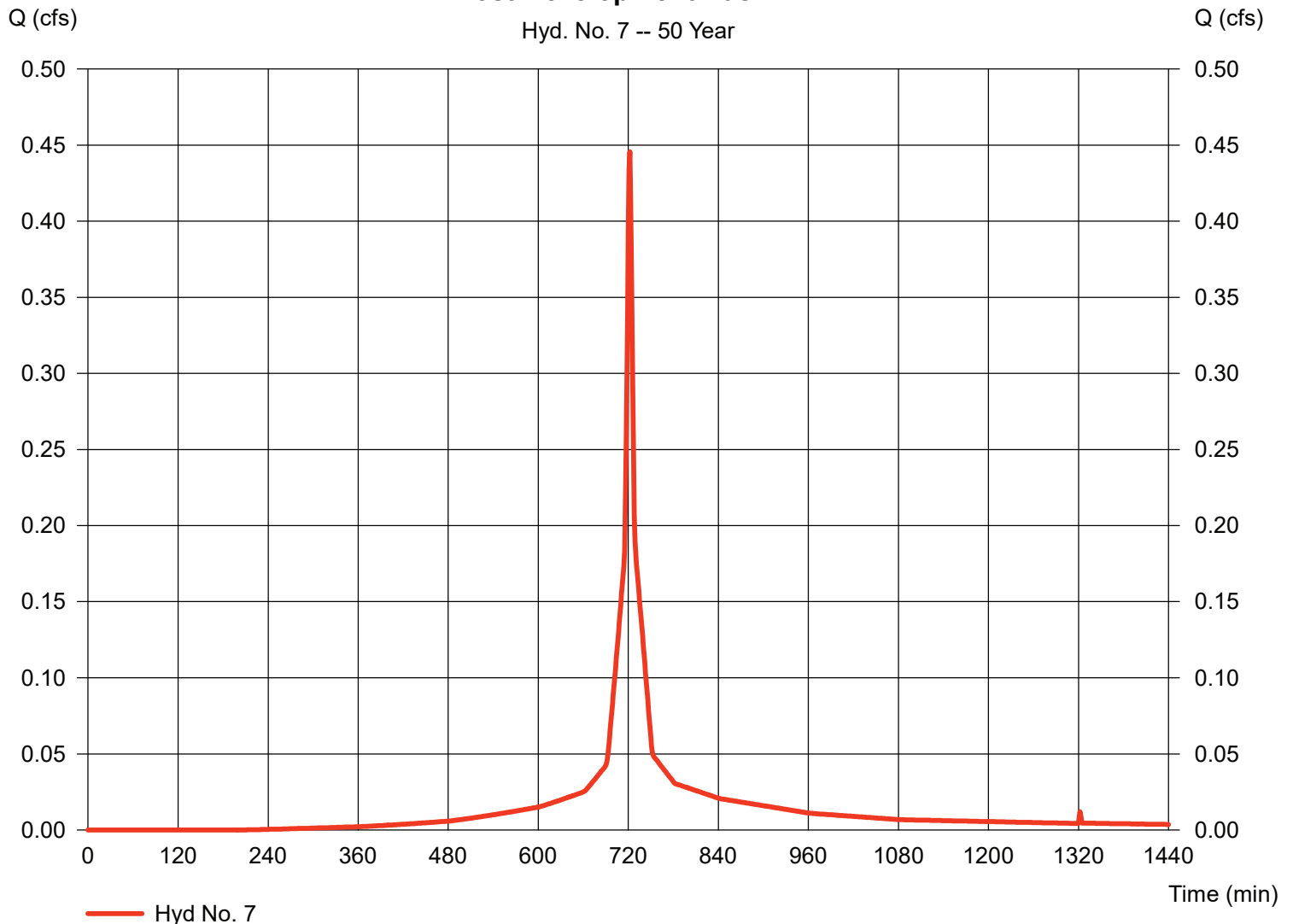
Hydrograph type = SCS Runoff  
Storm frequency = 50 yrs  
Time interval = 1 min  
Drainage area = 0.060 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.69 in  
Storm duration = 24 hrs

Peak discharge = 0.446 cfs  
Time to peak = 722 min  
Hyd. volume = 1,279 cuft  
Curve number = 88\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.11 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.037 \times 83) + (0.020 \times 98)] / 0.060$

### Post-Development Basin 2

Hyd. No. 7 -- 50 Year



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

## Hyd. No. 8

### Post-Development Basin 3

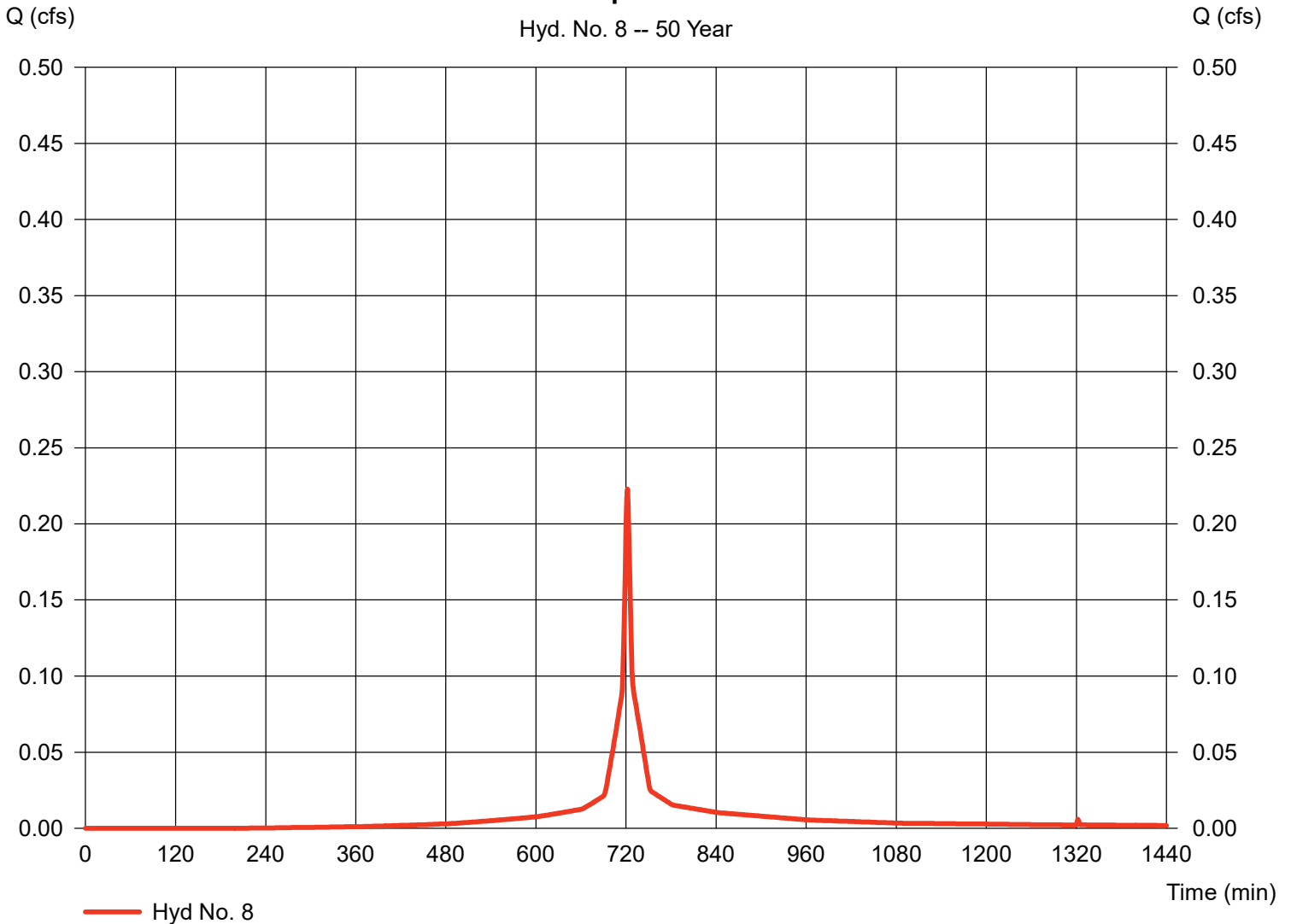
Hydrograph type = SCS Runoff  
Storm frequency = 50 yrs  
Time interval = 1 min  
Drainage area = 0.030 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.69 in  
Storm duration = 24 hrs

Peak discharge = 0.223 cfs  
Time to peak = 722 min  
Hyd. volume = 640 cuft  
Curve number = 88\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.007 \times 98) + (0.023 \times 85)] / 0.030$

### Post-Development Basin 3

Hyd. No. 8 -- 50 Year



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

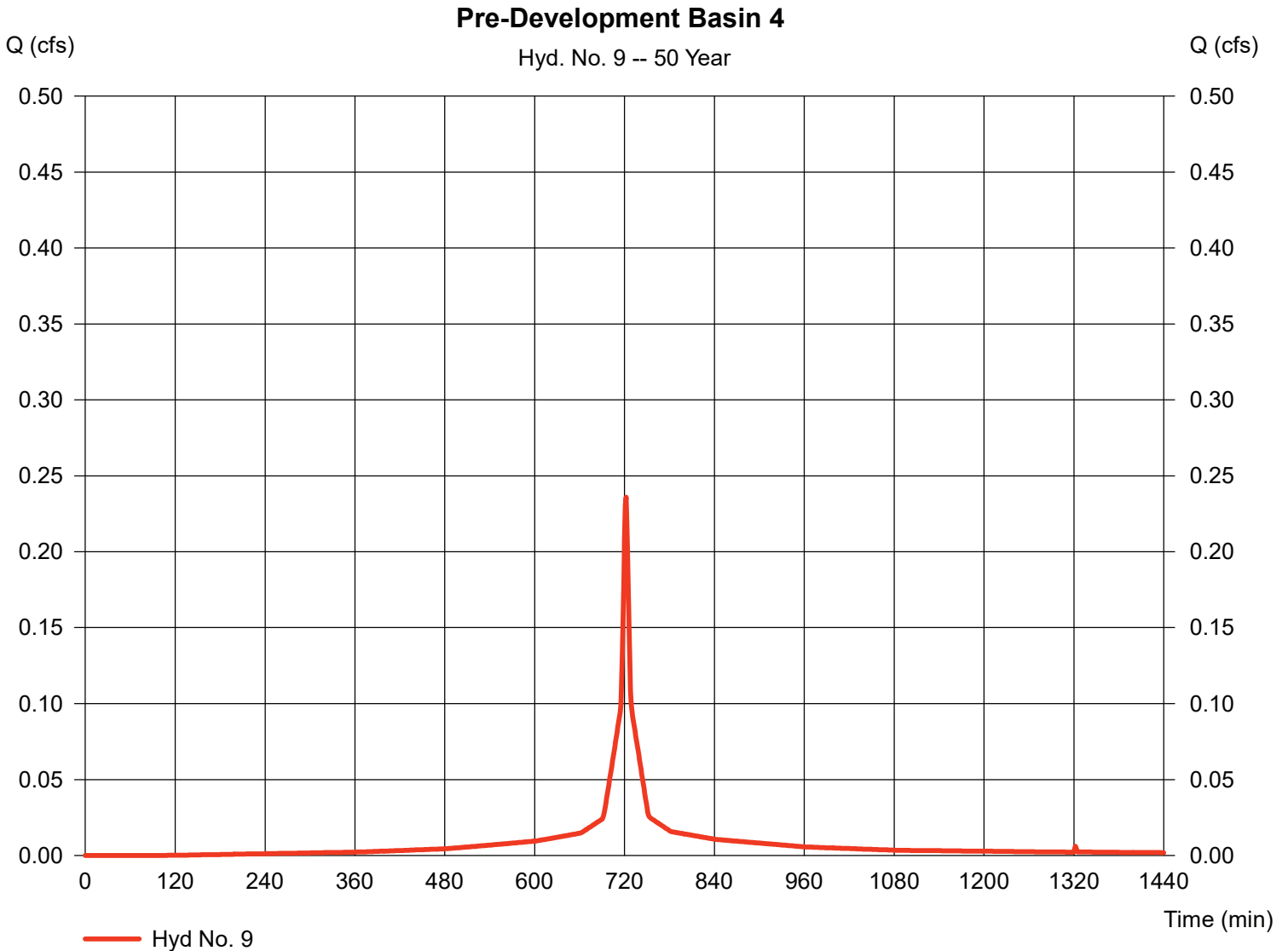
## Hyd. No. 9

### Pre-Development Basin 4

Hydrograph type = SCS Runoff  
Storm frequency = 50 yrs  
Time interval = 1 min  
Drainage area = 0.030 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.69 in  
Storm duration = 24 hrs

Peak discharge = 0.236 cfs  
Time to peak = 722 min  
Hyd. volume = 712 cuft  
Curve number = 94\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.020 \times 98) + (0.010 \times 85)] / 0.030$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

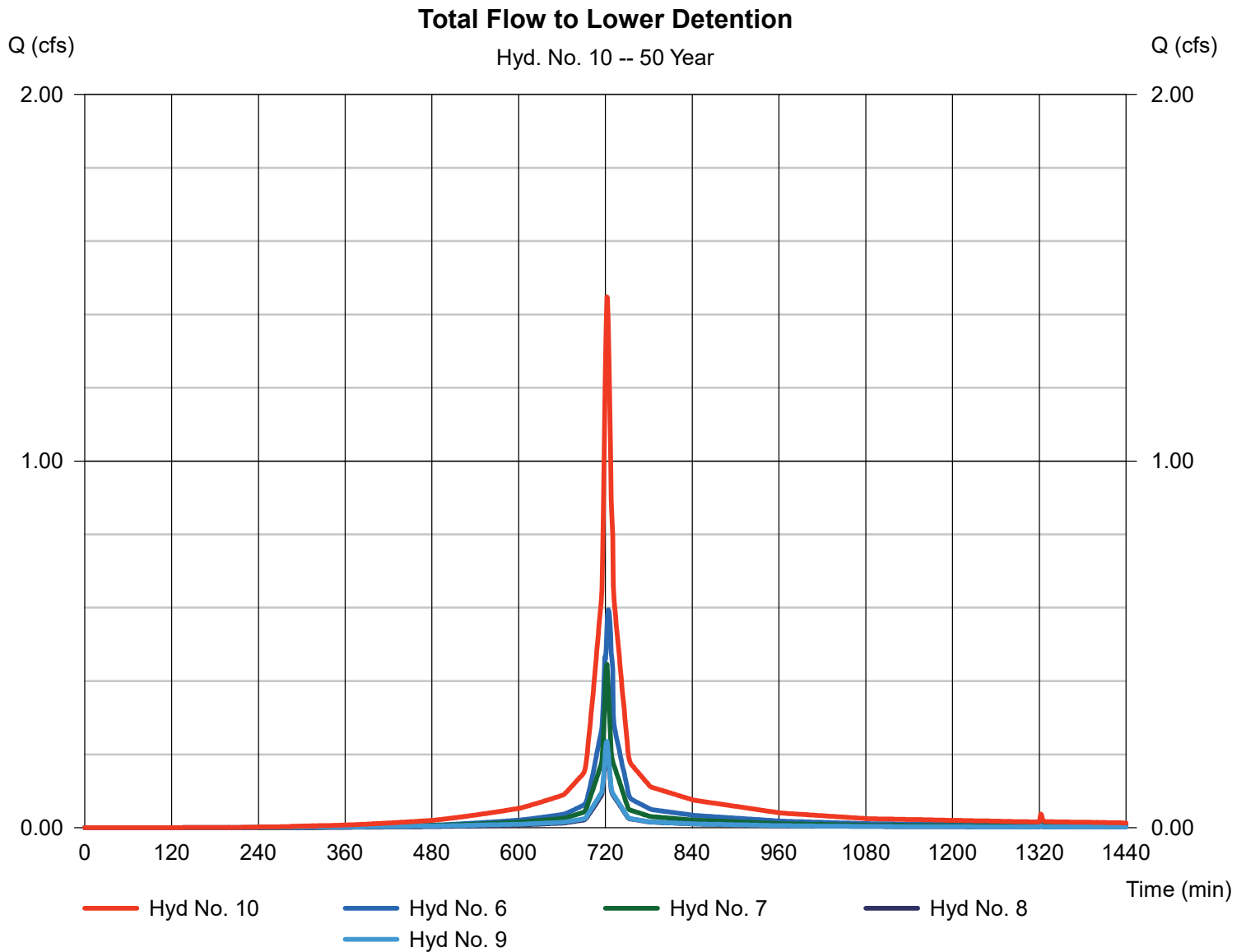
Monday, Dec 6, 2021

## Hyd. No. 10

Total Flow to Lower Detention

Hydrograph type = Combine  
Storm frequency = 50 yrs  
Time interval = 1 min  
Inflow hyds. = 6, 7, 8, 9

Peak discharge = 1.448 cfs  
Time to peak = 722 min  
Hyd. volume = 4,604 cuft  
Contrib. drain. area = 0.120 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

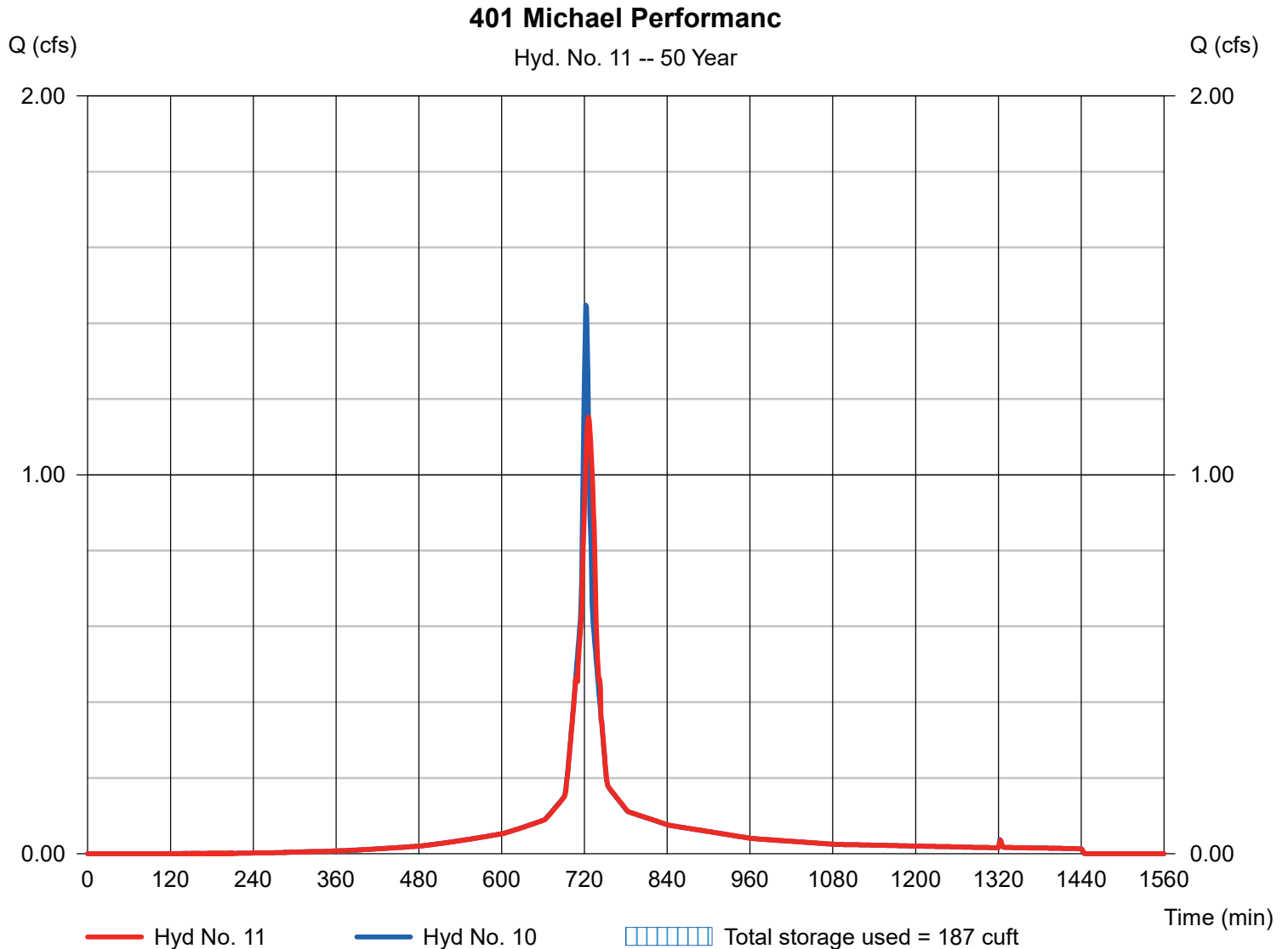
## Hyd. No. 11

401 Michael Performanc

Hydrograph type = Reservoir  
Storm frequency = 50 yrs  
Time interval = 1 min  
Inflow hyd. No. = 10 - Total Flow to Lower Detention  
Reservoir name = 401 Michael Detention

Peak discharge = 1.153 cfs  
Time to peak = 726 min  
Hyd. volume = 4,604 cuft  
Max. Elevation = 76.94 ft  
Max. Storage = 187 cuft

Storage Indication method used.





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

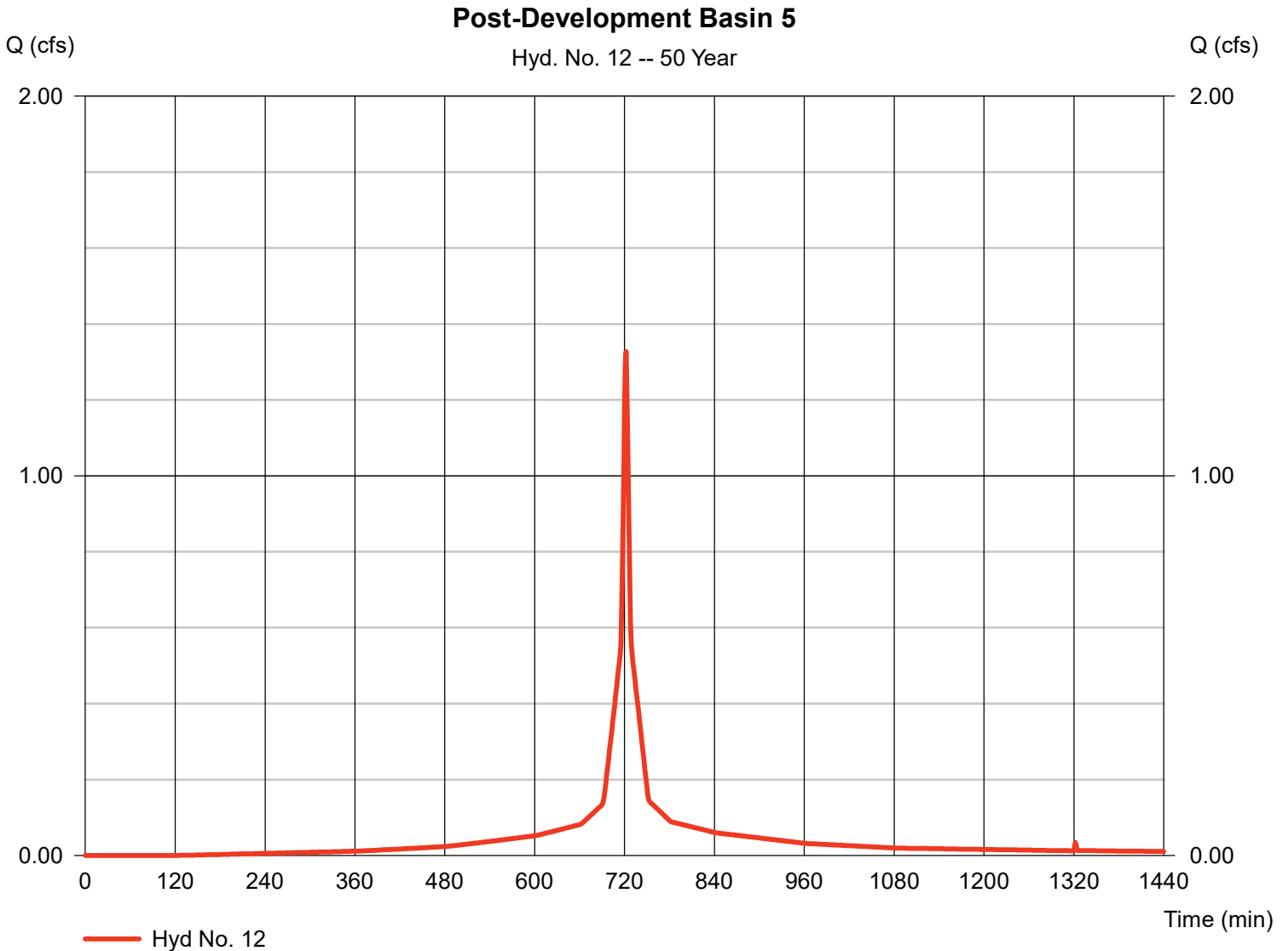
## Hyd. No. 12

Post-Development Basin 5

Hydrograph type = SCS Runoff  
Storm frequency = 50 yrs  
Time interval = 1 min  
Drainage area = 0.170 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.69 in  
Storm duration = 24 hrs

Peak discharge = 1.327 cfs  
Time to peak = 722 min  
Hyd. volume = 3,966 cuft  
Curve number = 93\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.90 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) = [(0.100 x 98) + (0.020 x 85) + (0.050 x 86)] / 0.170



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

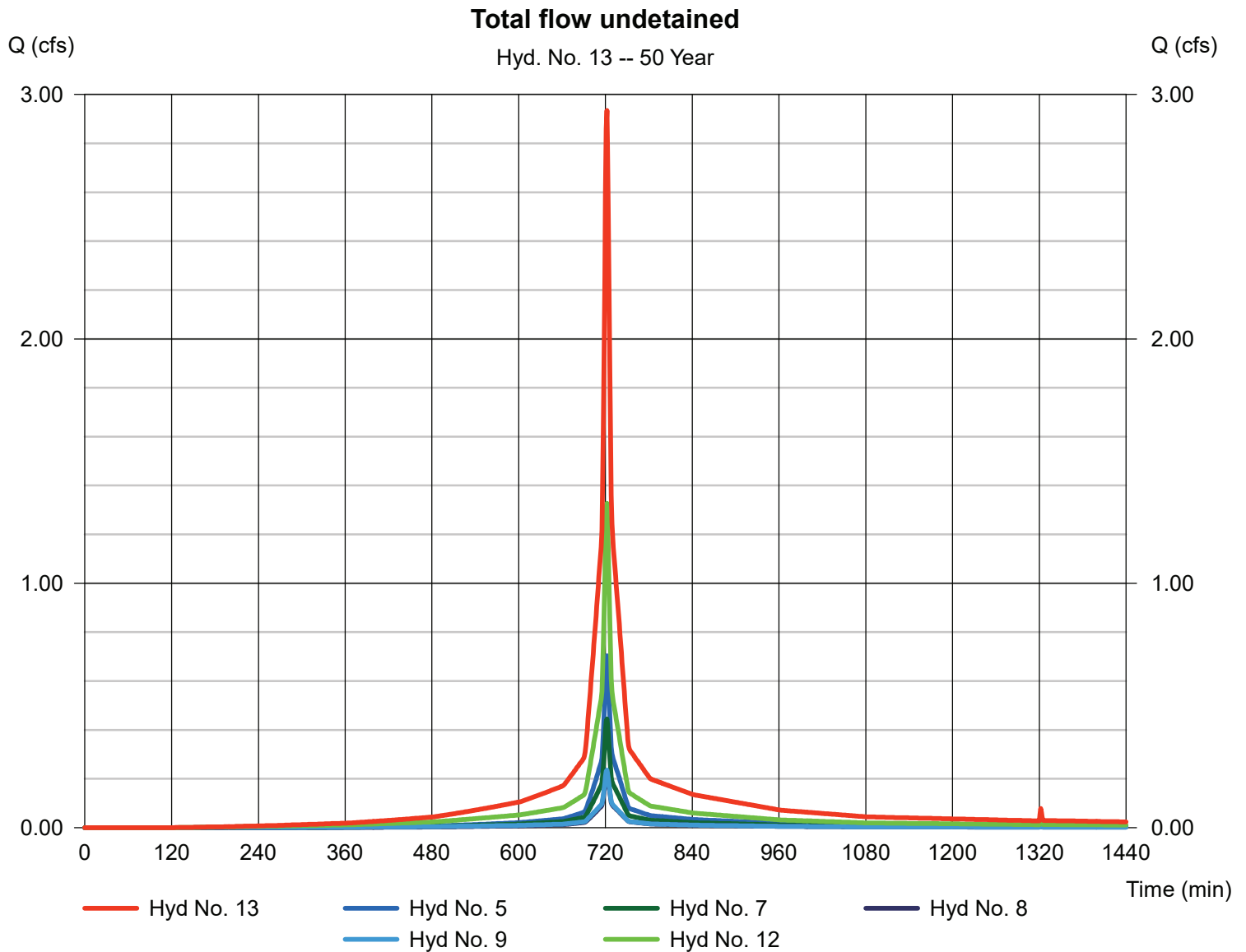
Monday, Dec 6, 2021

## Hyd. No. 13

Total flow undetained

Hydrograph type = Combine  
Storm frequency = 50 yrs  
Time interval = 1 min  
Inflow hyds. = 5, 7, 8, 9, 12

Peak discharge = 2.935 cfs  
Time to peak = 722 min  
Hyd. volume = 8,570 cuft  
Contrib. drain. area = 0.390 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

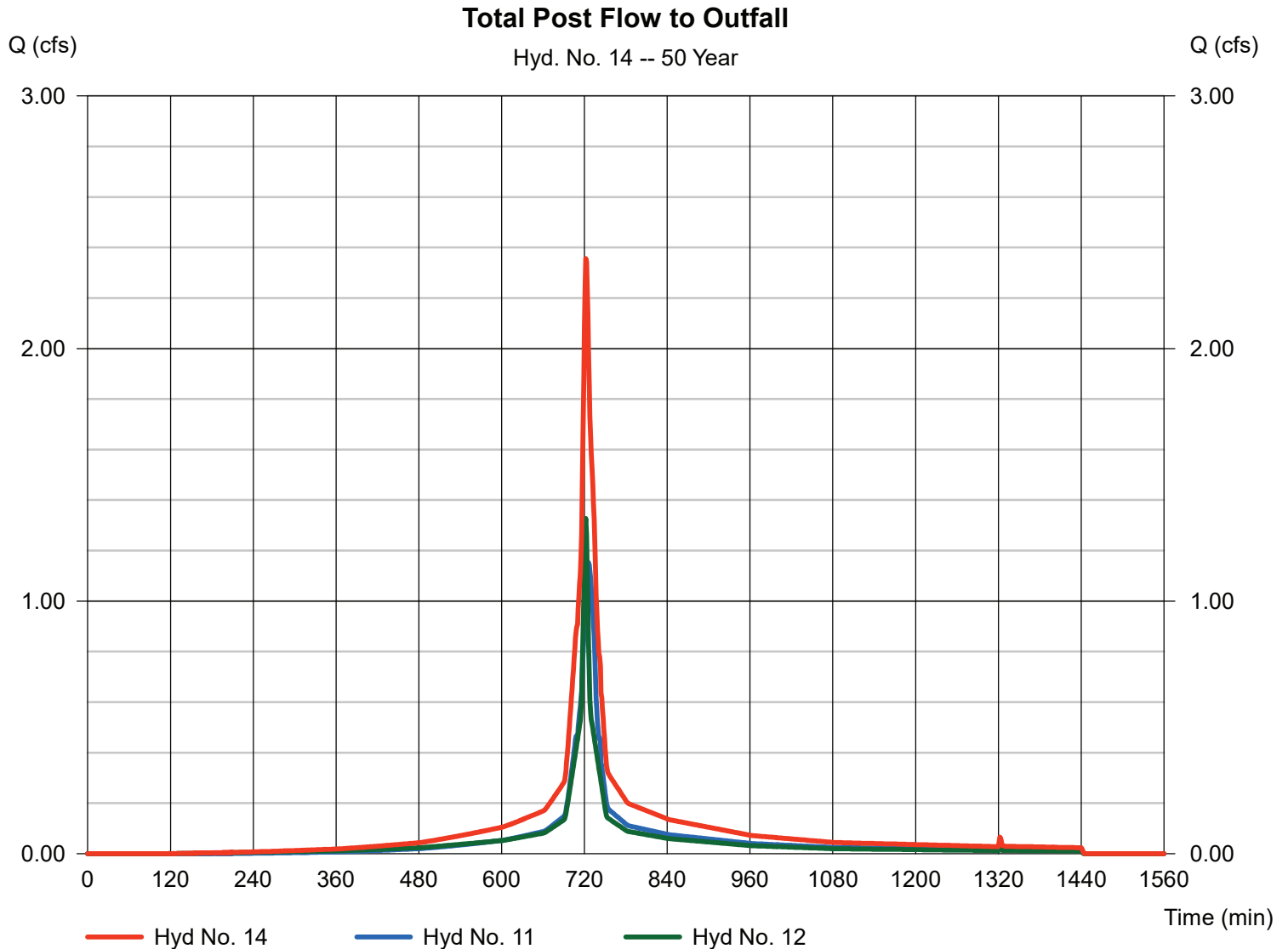
Monday, Dec 6, 2021

## Hyd. No. 14

Total Post Flow to Outfall

Hydrograph type = Combine  
Storm frequency = 50 yrs  
Time interval = 1 min  
Inflow hyds. = 11, 12

Peak discharge = 2.356 cfs  
Time to peak = 722 min  
Hyd. volume = 8,570 cuft  
Contrib. drain. area = 0.170 ac



# Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

| Hyd. No.             | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to peak (min) | Hyd. volume (cuft)      | Inflow hyd(s)  | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph description                |  |
|----------------------|--------------------------|-----------------|---------------------|--------------------|-------------------------|----------------|------------------------|-------------------------|---------------------------------------|--|
| 1                    | SCS Runoff               | 0.725           | 1                   | 722                | 2,050                   | ---            | ----                   | -----                   | Pre-Development Basin 1               |  |
| 2                    | SCS Runoff               | 2.548           | 1                   | 723                | 7,814                   | ---            | ----                   | -----                   | Pre-Development Basin 2               |  |
| 3                    | Combine                  | 3.239           | 1                   | 723                | 9,863                   | 1, 2           | ----                   | -----                   | Total Pre-Development Flow to Outfall |  |
| 5                    | SCS Runoff               | 0.805           | 1                   | 722                | 2,277                   | ---            | ----                   | -----                   | Post-Development Basin 1              |  |
| 6                    | Reservoir                | 0.671           | 1                   | 724                | 2,277                   | 5              | 86.66                  | 82.1                    | Upper Detention                       |  |
| 7                    | SCS Runoff               | 0.506           | 1                   | 722                | 1,465                   | ---            | ----                   | -----                   | Post-Development Basin 2              |  |
| 8                    | SCS Runoff               | 0.253           | 1                   | 722                | 733                     | ---            | ----                   | -----                   | Post-Development Basin 3              |  |
| 9                    | SCS Runoff               | 0.266           | 1                   | 722                | 806                     | ---            | ----                   | -----                   | Pre-Development Basin 4               |  |
| 10                   | Combine                  | 1.639           | 1                   | 722                | 5,281                   | 6, 7, 8, 9     | ----                   | -----                   | Total Flow to Lower Detention         |  |
| 11                   | Reservoir                | 1.225           | 1                   | 726                | 5,281                   | 10             | 77.20                  | 245                     | 401 Michael Performanc                |  |
| 12                   | SCS Runoff               | 1.496           | 1                   | 722                | 4,500                   | ---            | ----                   | -----                   | Post-Development Basin 5              |  |
| 13                   | Combine                  | 3.326           | 1                   | 722                | 9,781                   | 5, 7, 8, 9, 12 | ----                   | -----                   | Total flow undetained                 |  |
| 14                   | Combine                  | 2.602           | 1                   | 722                | 9,781                   | 11, 12,        | ----                   | -----                   | Total Post Flow to Outfall            |  |
| 401MichaelBasins.gpw |                          |                 |                     |                    | Return Period: 100 Year |                |                        | Monday, Dec 6, 2021     |                                       |  |

# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

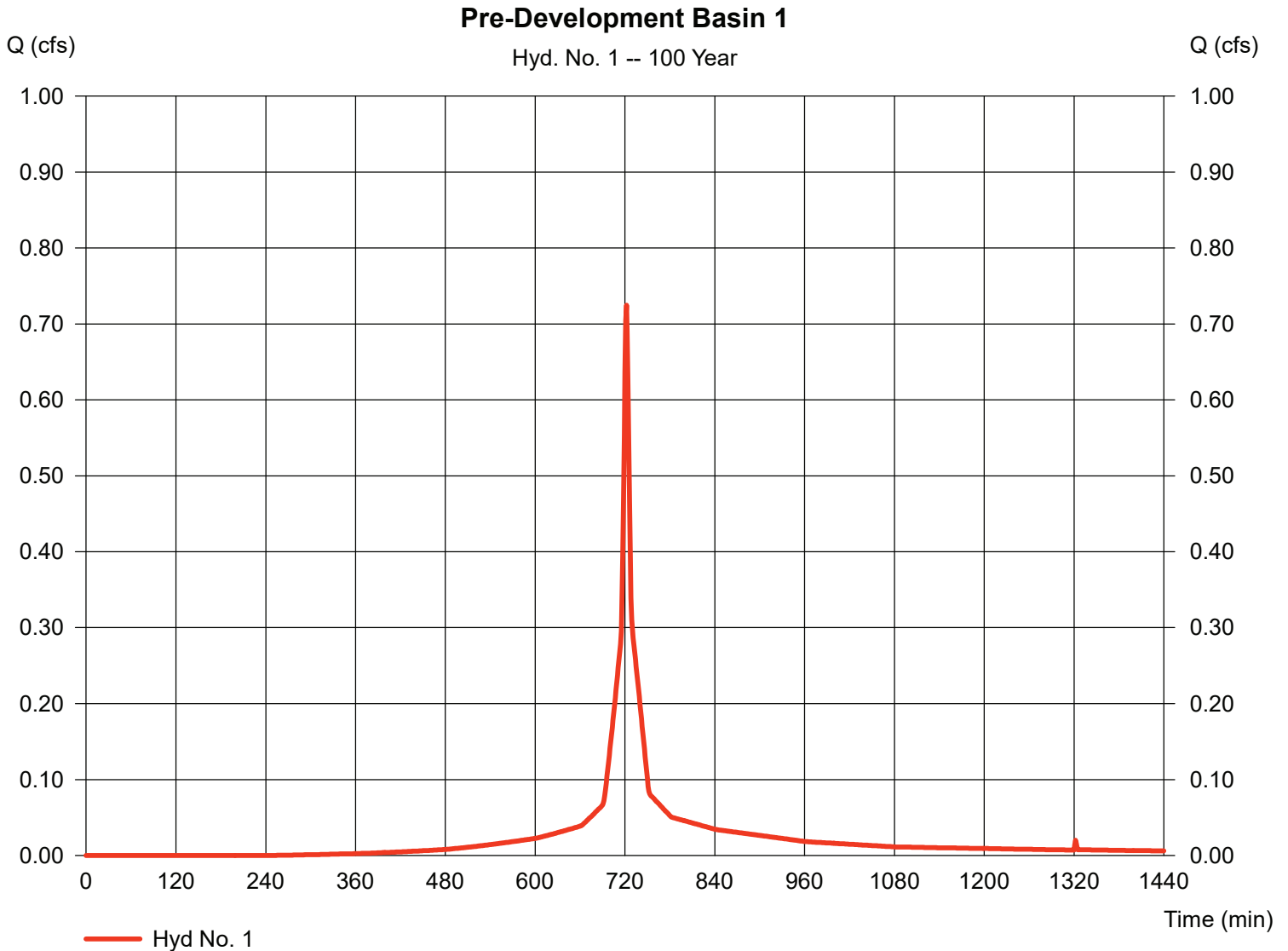
## Hyd. No. 1

### Pre-Development Basin 1

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Time interval = 1 min  
Drainage area = 0.090 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 8.62 in  
Storm duration = 24 hrs

Peak discharge = 0.725 cfs  
Time to peak = 722 min  
Hyd. volume = 2,050 cuft  
Curve number = 84\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.020 \times 85) + (0.070 \times 84)] / 0.090$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

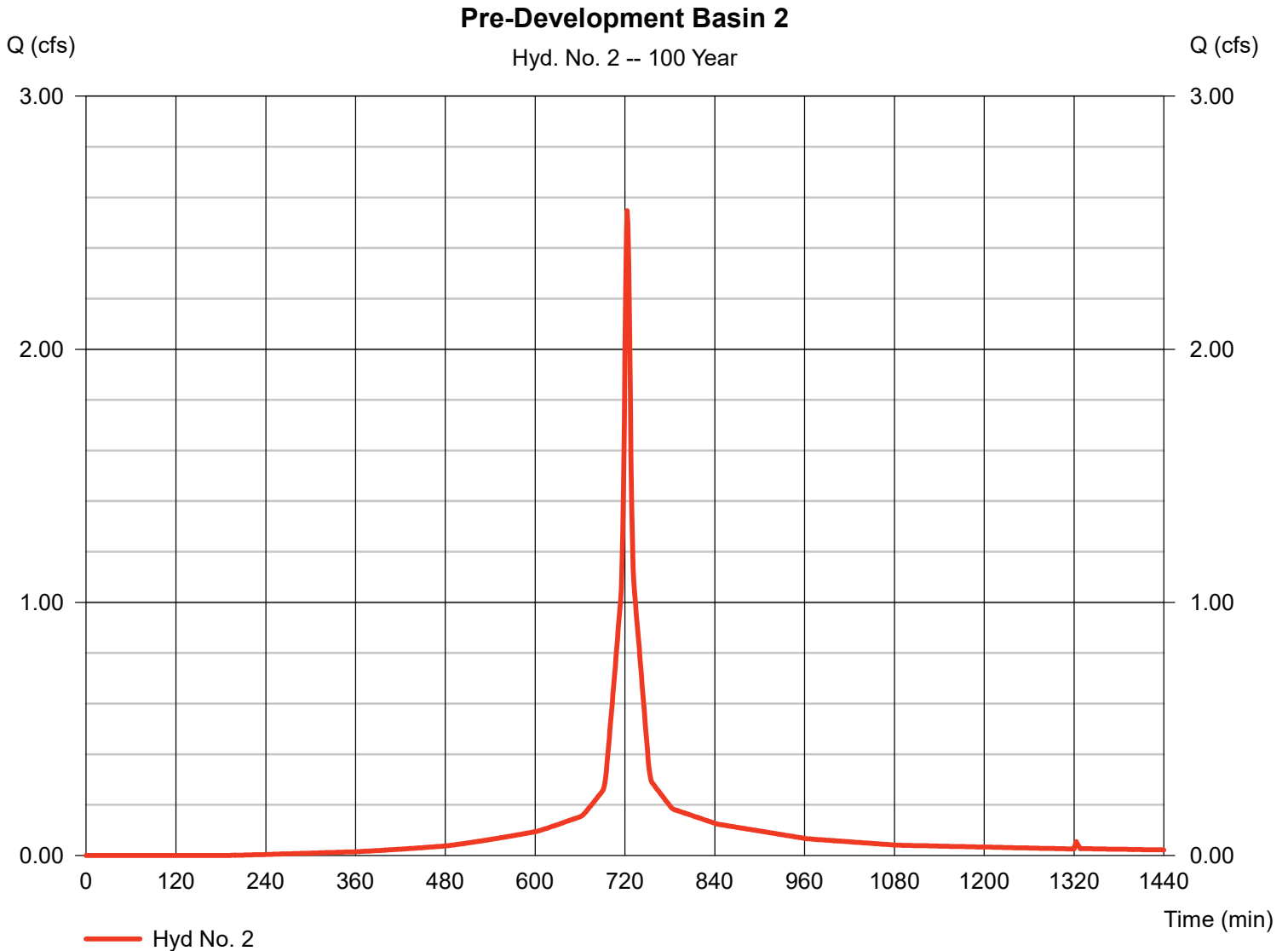
## Hyd. No. 2

### Pre-Development Basin 2

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Time interval = 1 min  
Drainage area = 0.300 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 8.62 in  
Storm duration = 24 hrs

Peak discharge = 2.548 cfs  
Time to peak = 723 min  
Hyd. volume = 7,814 cuft  
Curve number = 88\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 3.70 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.054 \times 83) + (0.123 \times 86) + (0.057 \times 98) + (0.064 \times 85)] / 0.300$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

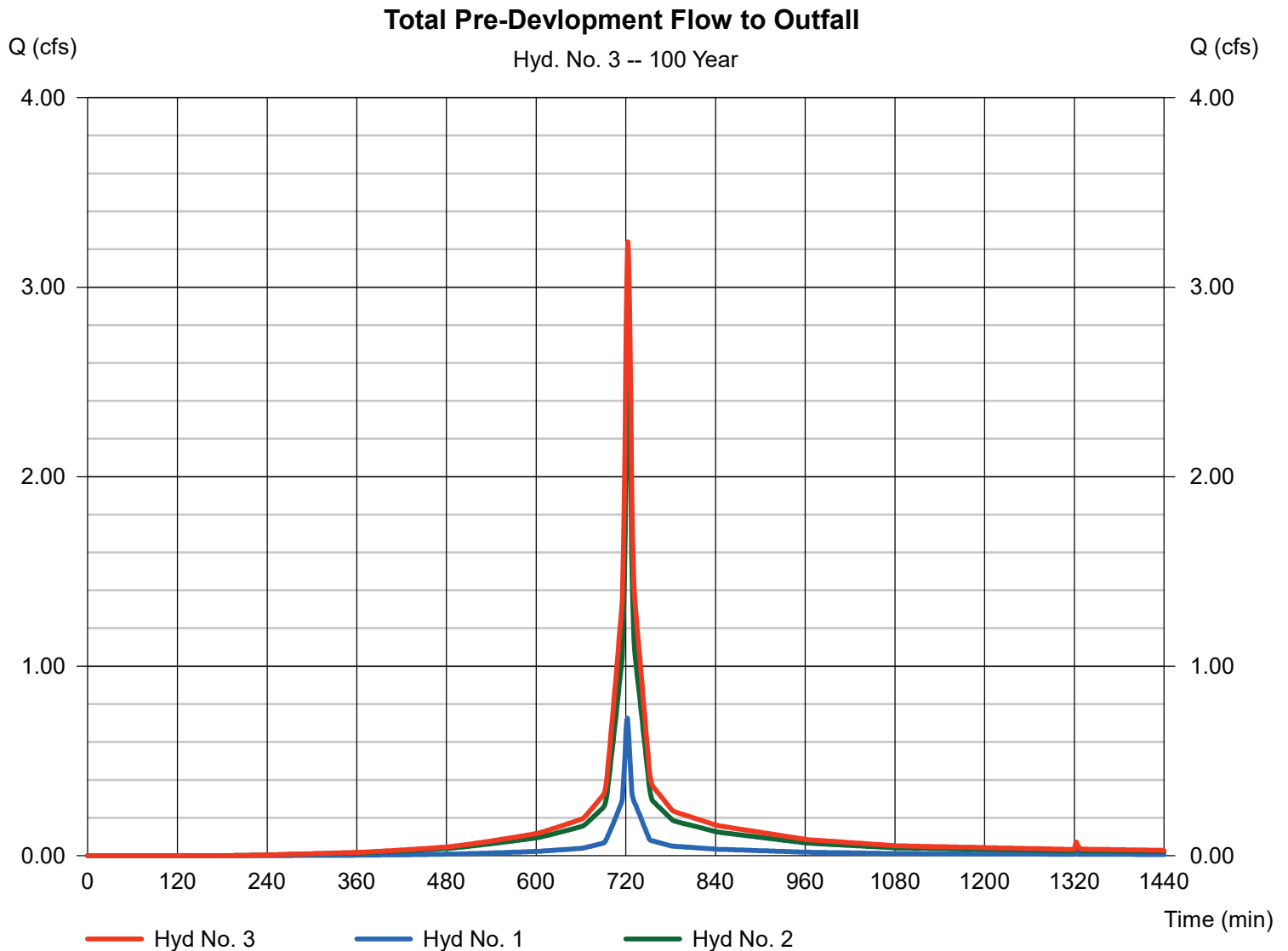
Monday, Dec 6, 2021

## Hyd. No. 3

Total Pre-Development Flow to Outfall

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Time interval = 1 min  
Inflow hyds. = 1, 2

Peak discharge = 3.239 cfs  
Time to peak = 723 min  
Hyd. volume = 9,863 cuft  
Contrib. drain. area = 0.390 ac





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

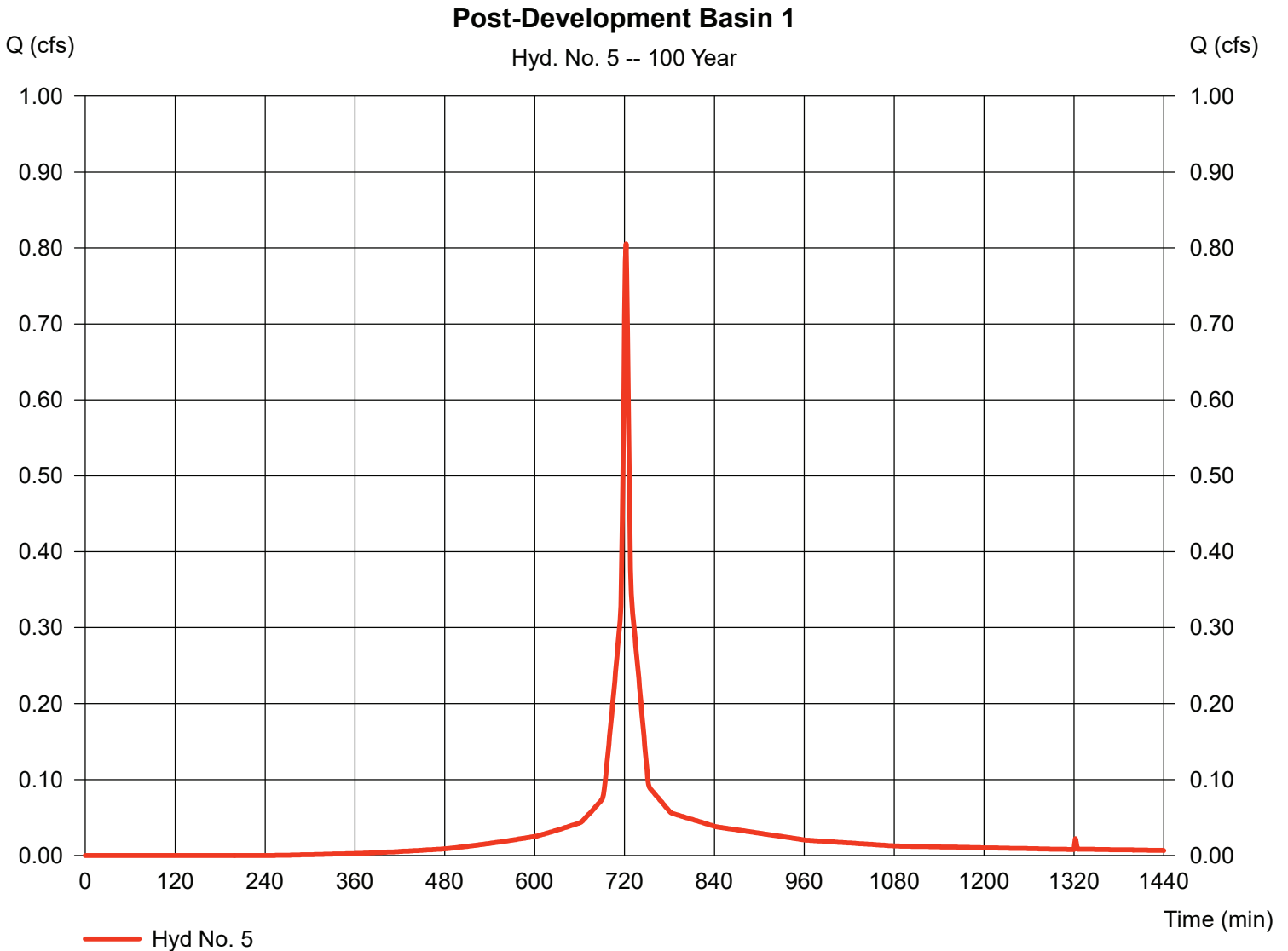
## Hyd. No. 5

### Post-Development Basin 1

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Time interval = 1 min  
Drainage area = 0.100 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 8.62 in  
Storm duration = 24 hrs

Peak discharge = 0.805 cfs  
Time to peak = 722 min  
Hyd. volume = 2,277 cuft  
Curve number = 84\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) = [(0.020 x 98) + (0.020 x 83) + (0.060 x 80)] / 0.100



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

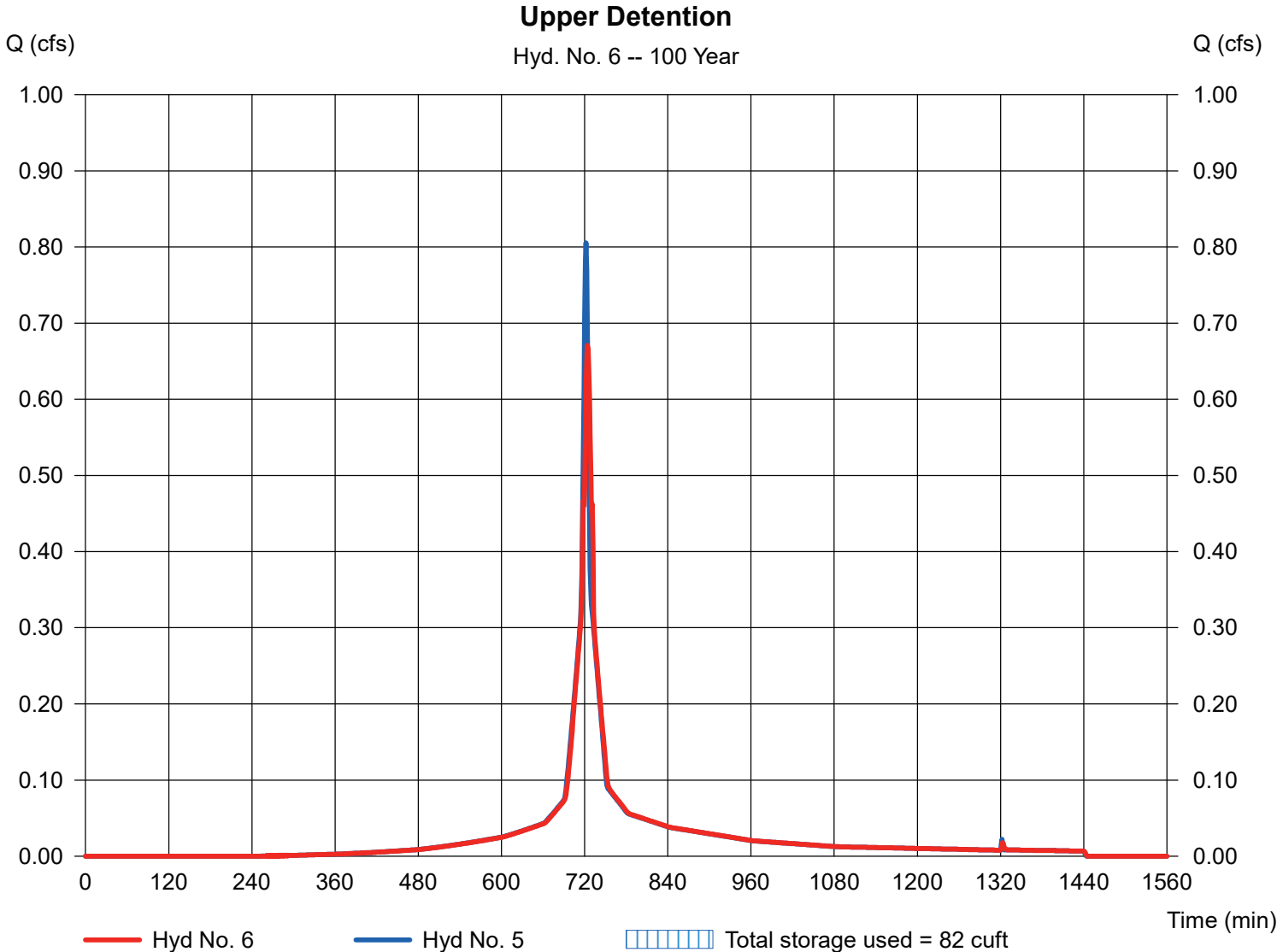
## Hyd. No. 6

Upper Detention

Hydrograph type = Reservoir  
Storm frequency = 100 yrs  
Time interval = 1 min  
Inflow hyd. No. = 5 - Post-Development Basin 1  
Reservoir name = 401 Upper Detention

Peak discharge = 0.671 cfs  
Time to peak = 724 min  
Hyd. volume = 2,277 cuft  
Max. Elevation = 86.66 ft  
Max. Storage = 82 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

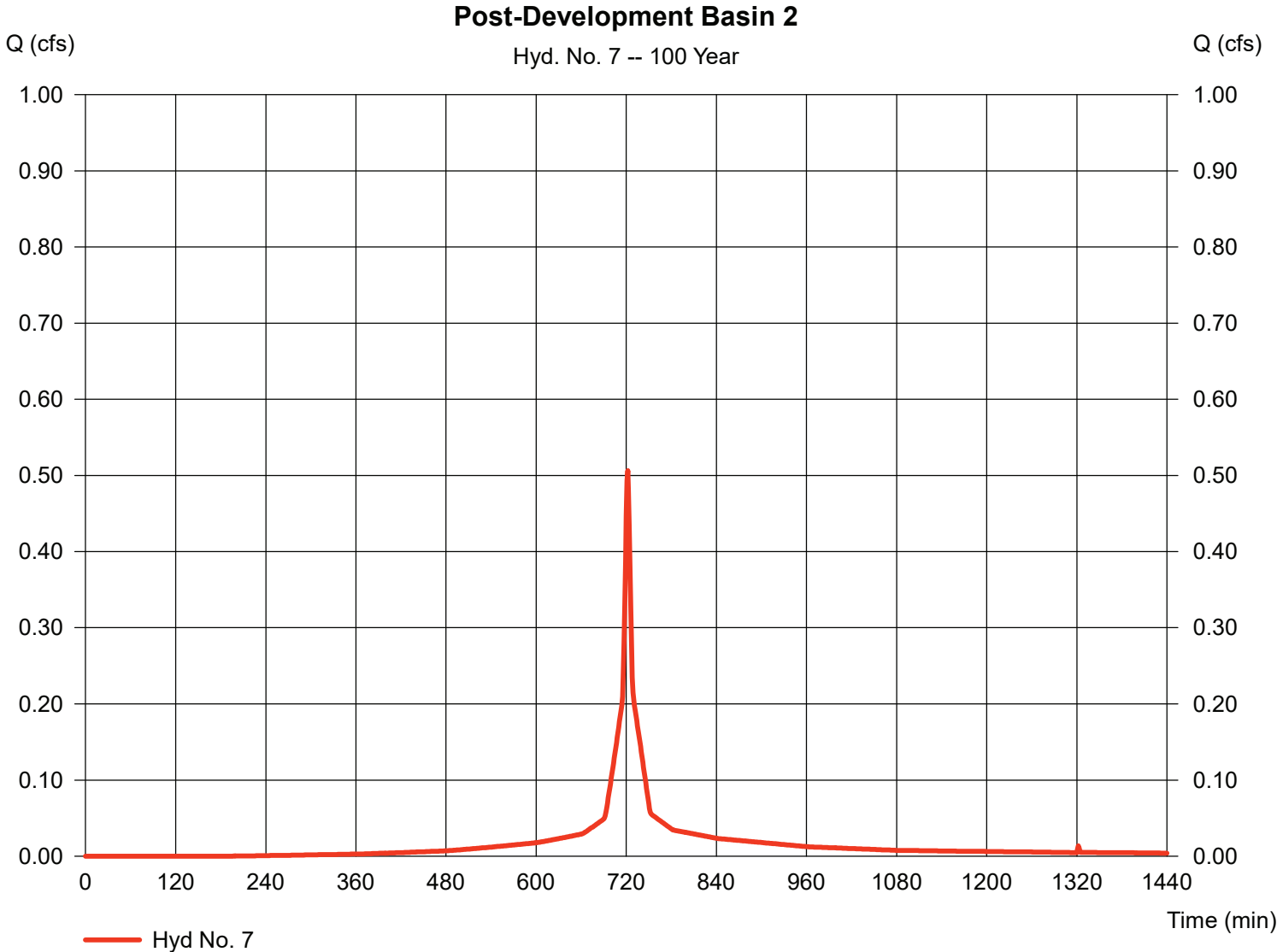
## Hyd. No. 7

### Post-Development Basin 2

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Time interval = 1 min  
Drainage area = 0.060 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 8.62 in  
Storm duration = 24 hrs

Peak discharge = 0.506 cfs  
Time to peak = 722 min  
Hyd. volume = 1,465 cuft  
Curve number = 88\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.11 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.037 \times 83) + (0.020 \times 98)] / 0.060$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

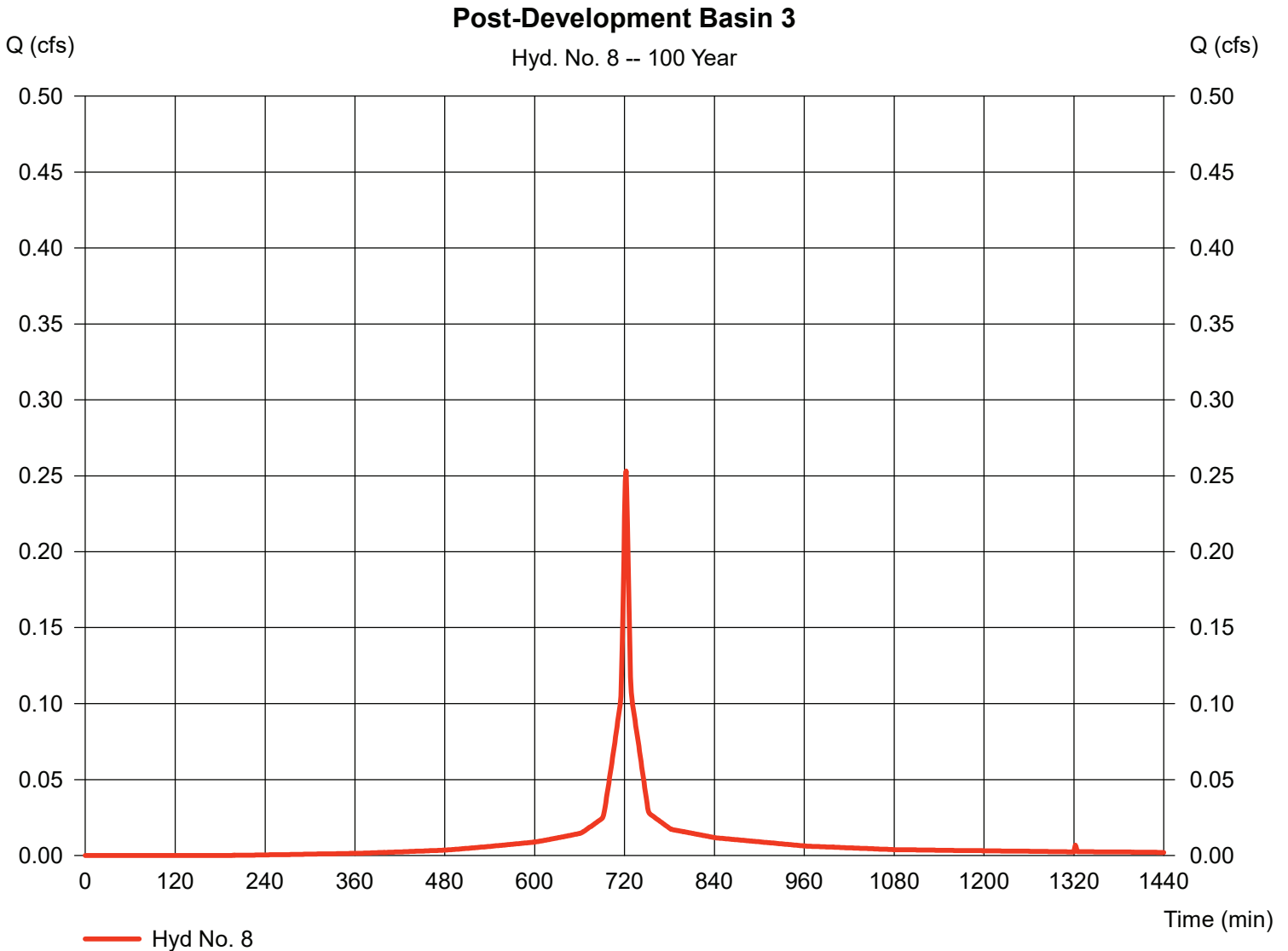
## Hyd. No. 8

### Post-Development Basin 3

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Time interval = 1 min  
Drainage area = 0.030 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 8.62 in  
Storm duration = 24 hrs

Peak discharge = 0.253 cfs  
Time to peak = 722 min  
Hyd. volume = 733 cuft  
Curve number = 88\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.007 \times 98) + (0.023 \times 85)] / 0.030$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

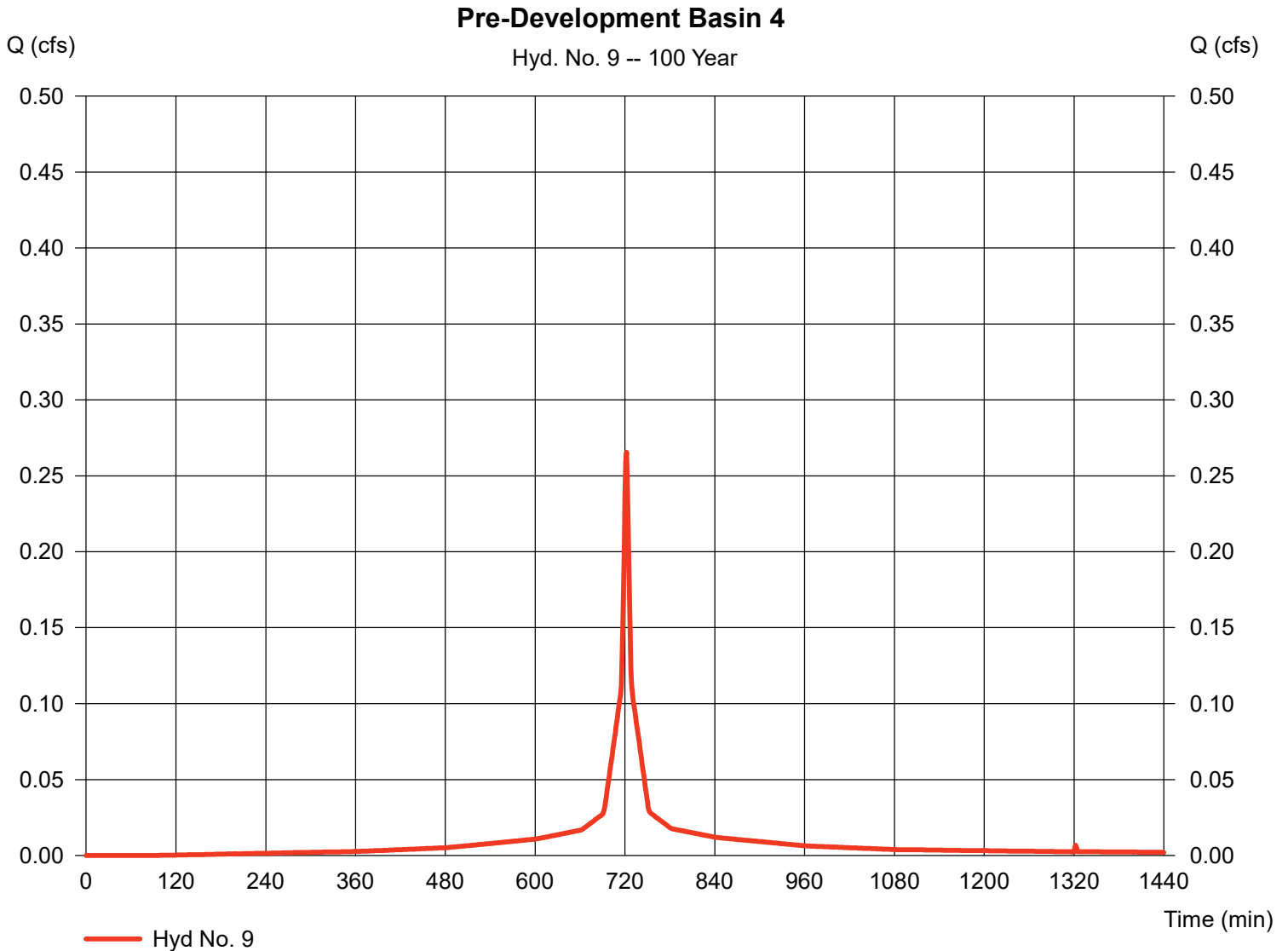
## Hyd. No. 9

### Pre-Development Basin 4

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Time interval = 1 min  
Drainage area = 0.030 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 8.62 in  
Storm duration = 24 hrs

Peak discharge = 0.266 cfs  
Time to peak = 722 min  
Hyd. volume = 806 cuft  
Curve number = 94\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.00 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) =  $[(0.020 \times 98) + (0.010 \times 85)] / 0.030$



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

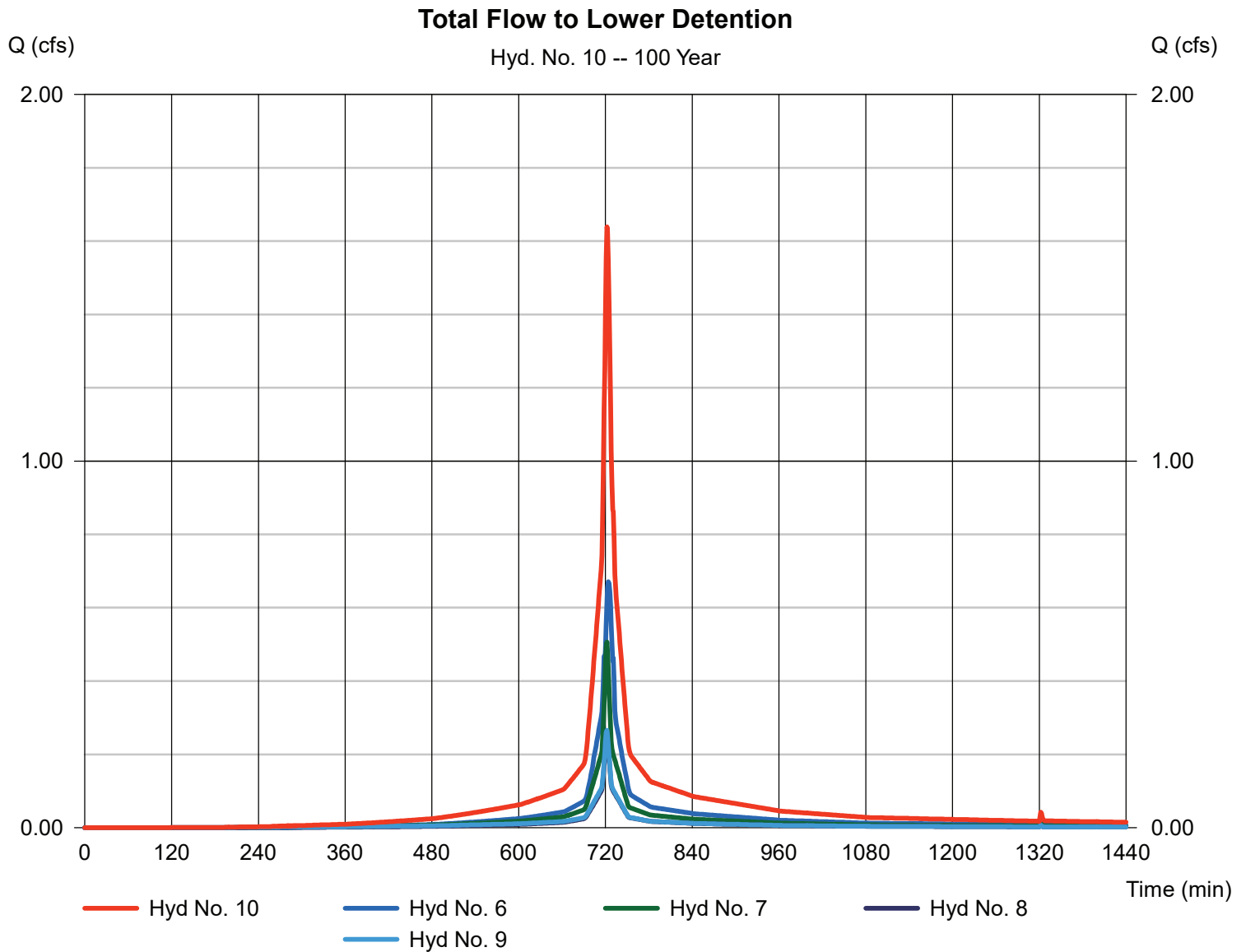
Monday, Dec 6, 2021

## Hyd. No. 10

Total Flow to Lower Detention

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Time interval = 1 min  
Inflow hyds. = 6, 7, 8, 9

Peak discharge = 1.639 cfs  
Time to peak = 722 min  
Hyd. volume = 5,281 cuft  
Contrib. drain. area = 0.120 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

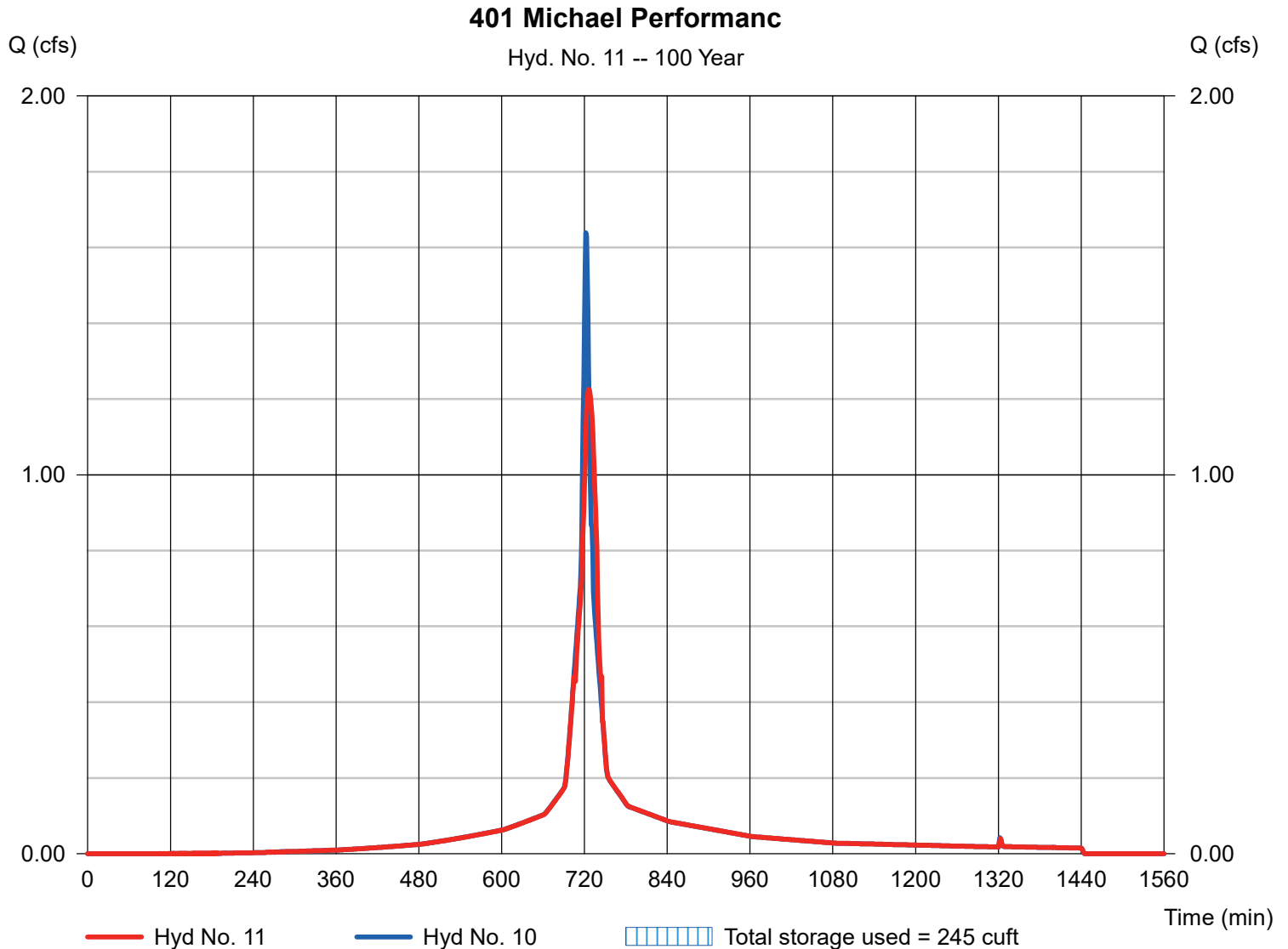
## Hyd. No. 11

401 Michael Performanc

Hydrograph type = Reservoir  
Storm frequency = 100 yrs  
Time interval = 1 min  
Inflow hyd. No. = 10 - Total Flow to Lower Detention  
Reservoir name = 401 Michael Detention

Peak discharge = 1.225 cfs  
Time to peak = 726 min  
Hyd. volume = 5,281 cuft  
Max. Elevation = 77.20 ft  
Max. Storage = 245 cuft

Storage Indication method used.





# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Monday, Dec 6, 2021

## Hyd. No. 12

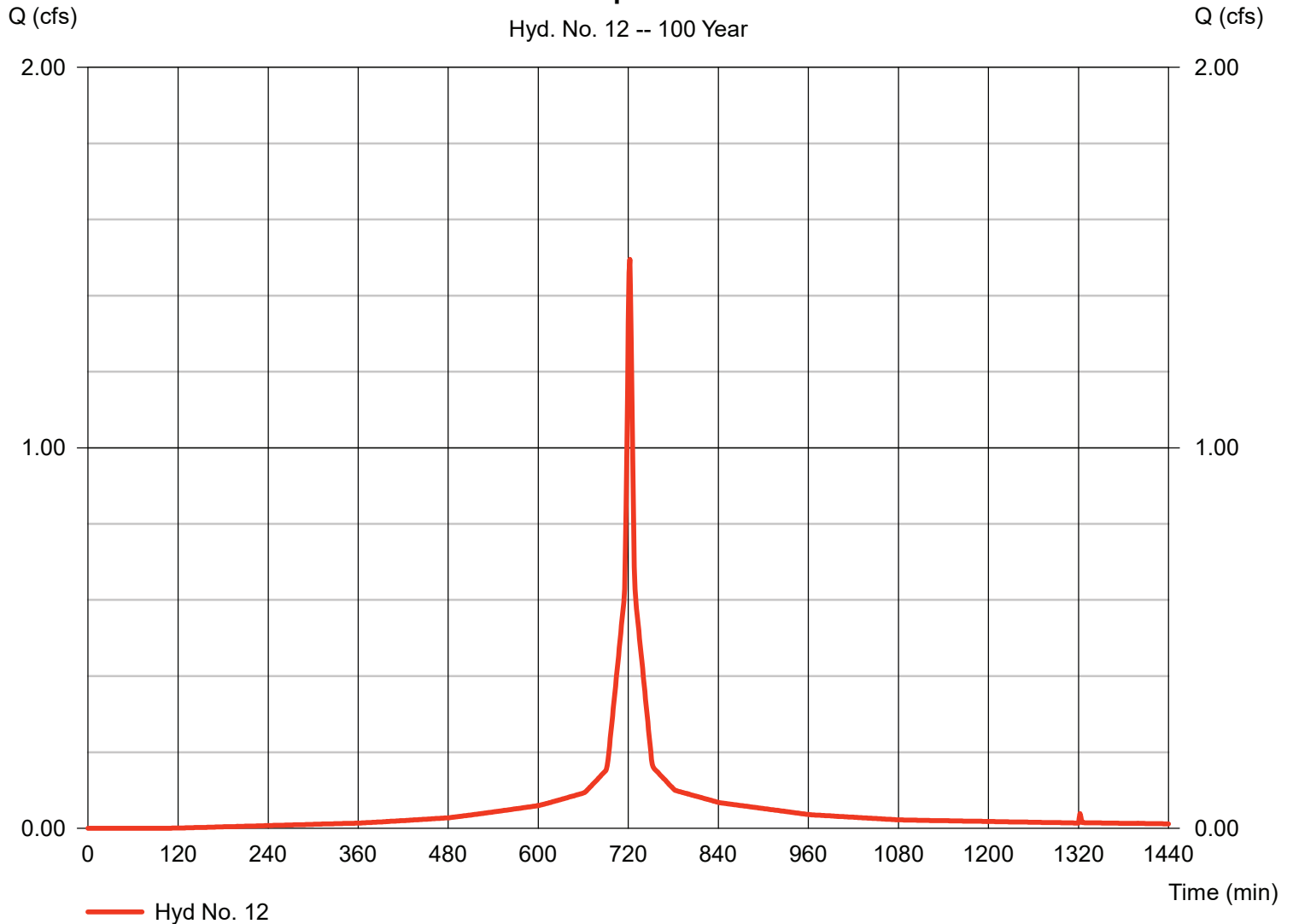
### Post-Development Basin 5

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Time interval = 1 min  
Drainage area = 0.170 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 8.62 in  
Storm duration = 24 hrs

Peak discharge = 1.496 cfs  
Time to peak = 722 min  
Hyd. volume = 4,500 cuft  
Curve number = 93\*  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 2.90 min  
Distribution = Type III  
Shape factor = 484

\* Composite (Area/CN) = [(0.100 x 98) + (0.020 x 85) + (0.050 x 86)] / 0.170

### Post-Development Basin 5



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

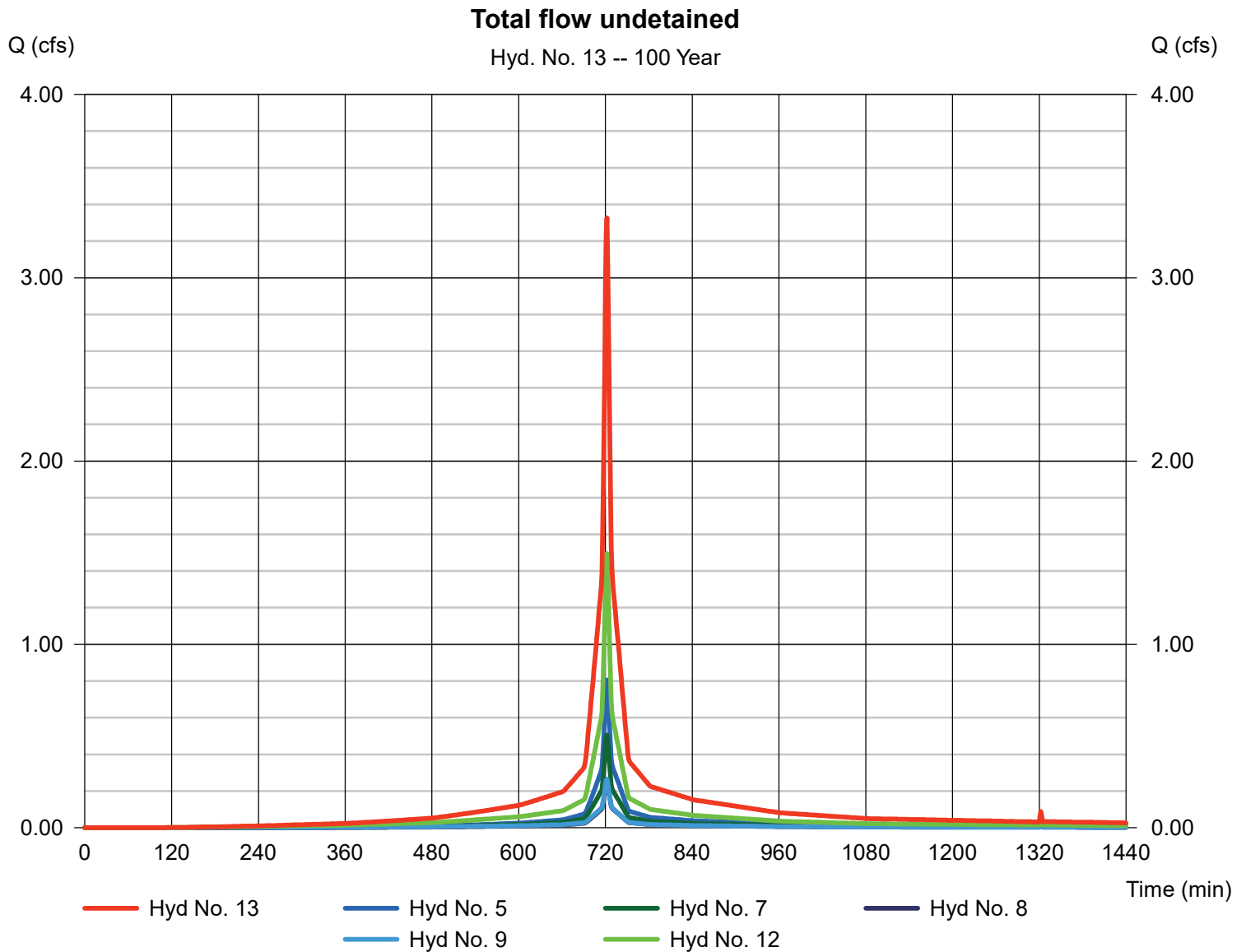
Monday, Dec 6, 2021

## Hyd. No. 13

Total flow undetained

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Time interval = 1 min  
Inflow hyds. = 5, 7, 8, 9, 12

Peak discharge = 3.326 cfs  
Time to peak = 722 min  
Hyd. volume = 9,781 cuft  
Contrib. drain. area = 0.390 ac



# Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

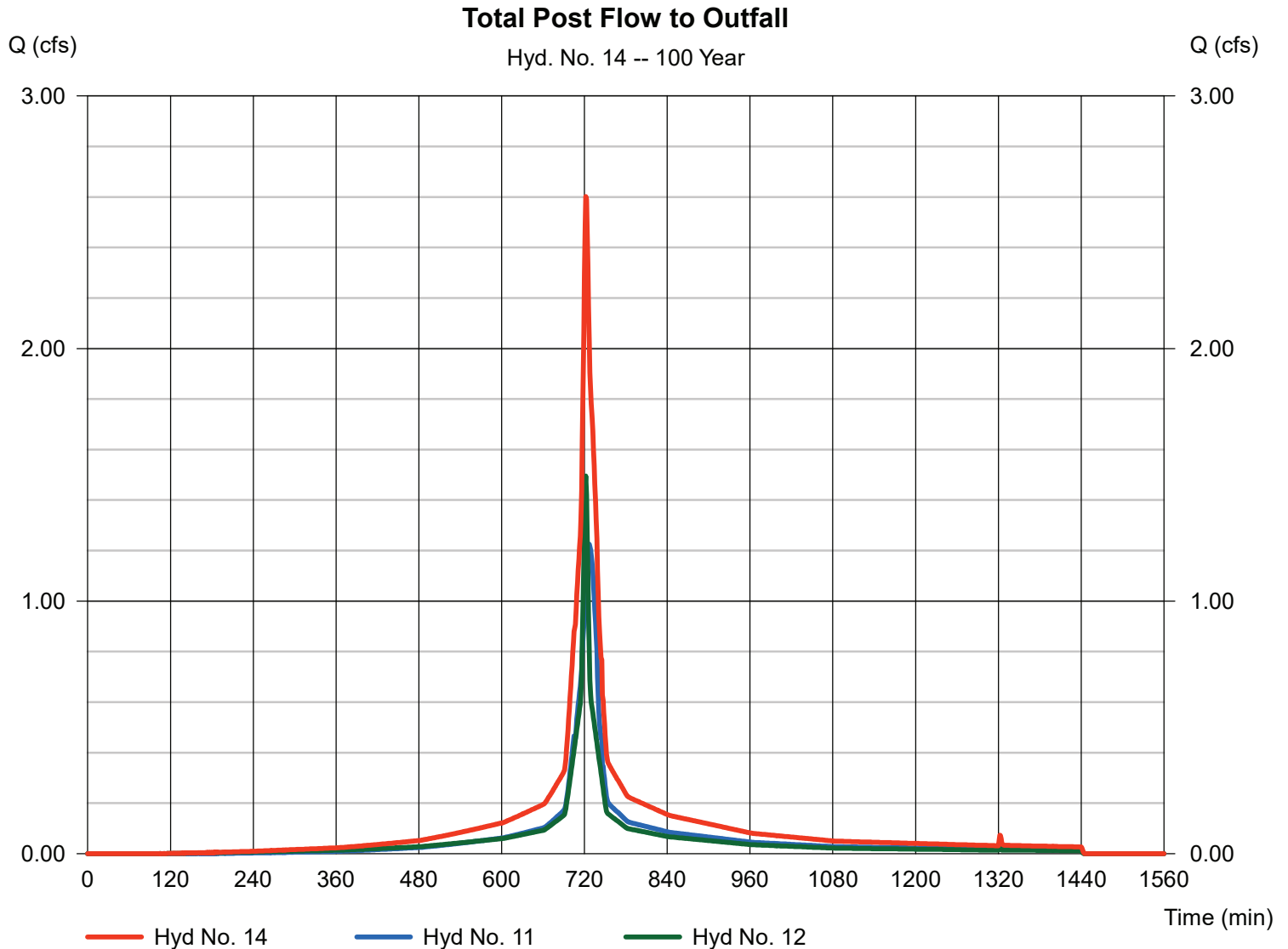
Monday, Dec 6, 2021

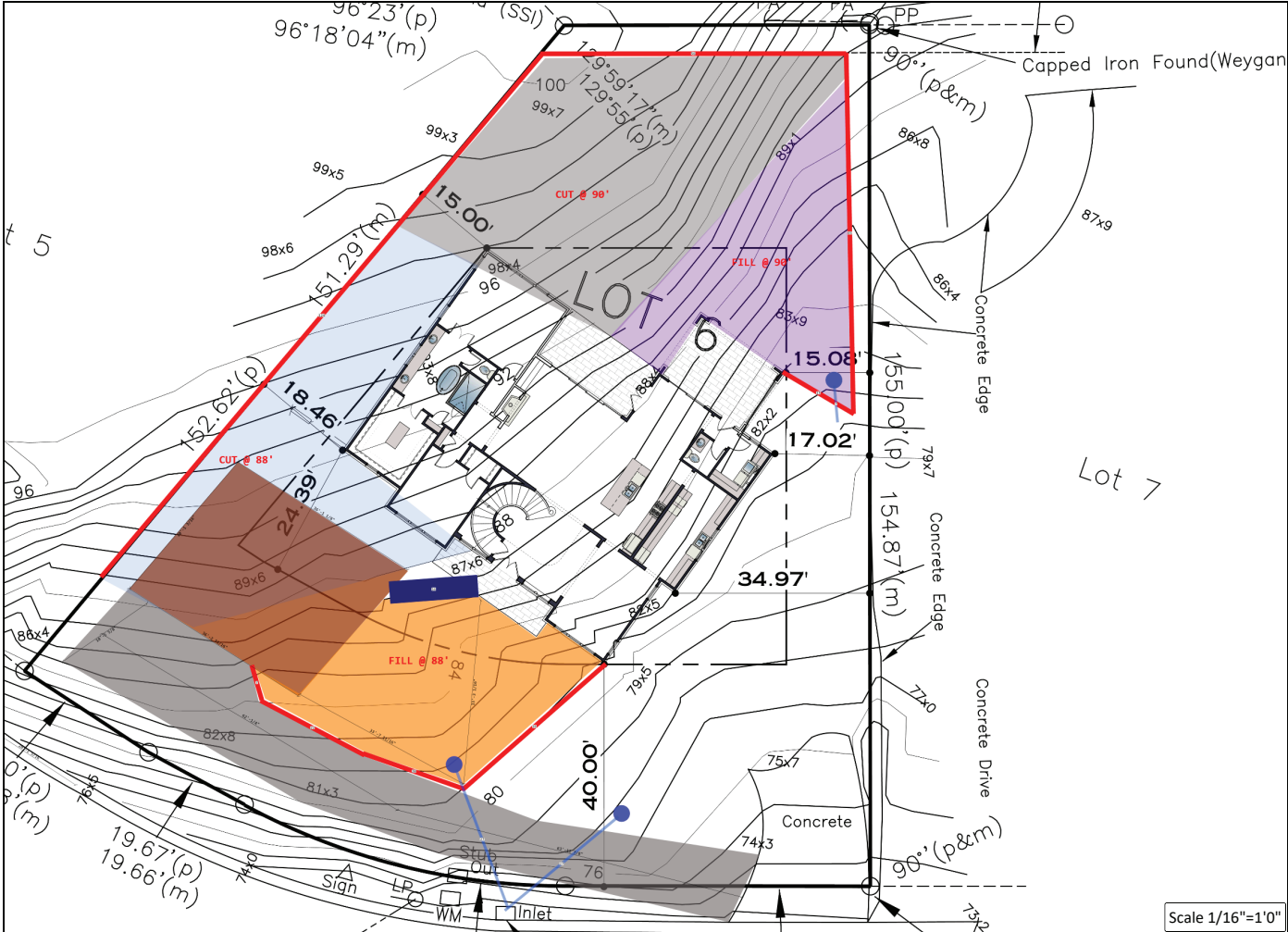
## Hyd. No. 14

Total Post Flow to Outfall

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Time interval = 1 min  
Inflow hyds. = 11, 12

Peak discharge = 2.602 cfs  
Time to peak = 722 min  
Hyd. volume = 9,781 cuft  
Contrib. drain. area = 0.170 ac





|   |                      |
|---|----------------------|
| Tiffany_Andrew Linn   |                      |
| GRADING PLAN  |                      |
| <p>These placement plans for the products provided to us. This service is solely intended for product application assistance; it is not intended to be used as a substitute for professional engineering or architectural services. The designer of record and/or builder/owner is responsible to ensure these drawings are complete with the entire project.</p> |                      |
| Estimator: Estimator Name   | Tracking: Tracking # |
| Sheet 1 of 1  |                      |

Scale 1/16"=1'0"



## Variance Application - Part I

### Project Data

Address of Subject Property 2704 WOODRIDGE ROAD, MOUNTAIN BROOK, AL 35223

Zoning Classification RESIDENCE A DISTRICT

Name of Property Owner(s) WILLIAM AND JUDY NELSON

Phone Number \_\_\_\_\_ Email bnelson@nelbro.com

Name of Surveyor WILLIAM CALLAHAN

Phone Number 205-229-1993 Email will@southcentralsurveying.com

Name of Architect (if applicable) DAVID LORBERBAUM

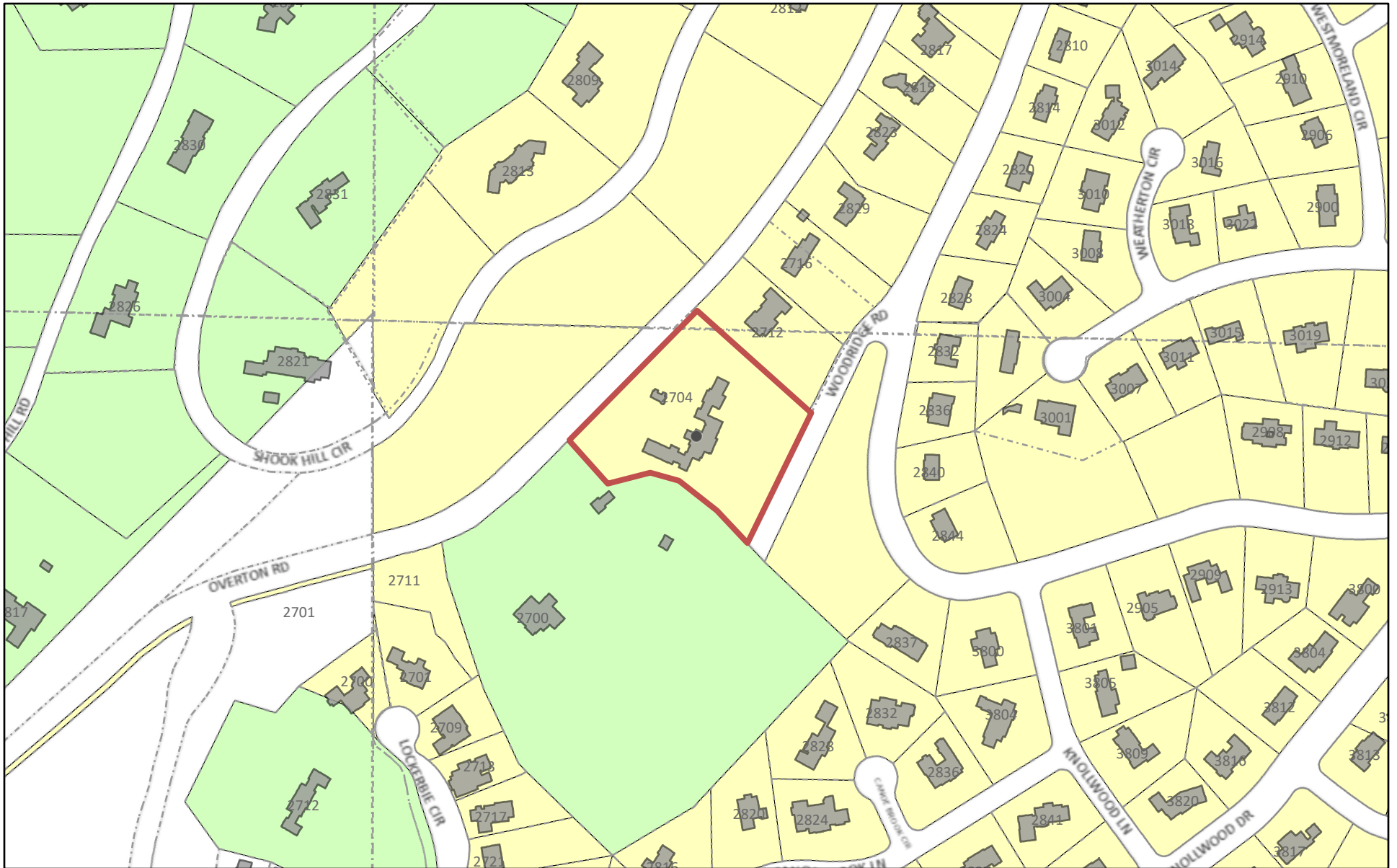
Phone Number 205-934-4711 Email dlorberbaum@lorberbauminc.com

Property owner or representative agent must be present at hearing

Please **fill in only applicable** project information (relating directly to the variance request(s):

|  | Zoning Code Requirement | Existing Development | Proposed Development    |
|--|-------------------------|----------------------|-------------------------|
| Lot Area (sf)  |                         |                      |                         |
| Lot Width (ft)   |                         |                      |                         |
| Front Setback (ft) <i>primary</i>  |                         |                      |                         |
| Front Setback (ft) <i>secondary</i>  |                         |                      |                         |
| Right Side Setback   |                         |                      |                         |
| Left Side Setback  |                         |                      |                         |
| Right Side Setback (ft):<br>For non-conforming narrow lots in Res-B or Res-C:<br>Less than 22' high →<br>22' high or greater → |                         |                      |                         |
| Left Side Setback (ft):<br>For non-conforming narrow lots in Res-B or Res-C:<br>Less than 22' high →<br>22' high or greater →  |                         |                      |                         |
| Rear Setback (ft)  |                         |                      |                         |
| Lot Coverage (%)   |                         |                      |                         |
| Building Height (ft)   |                         |                      |                         |
| Other  |                         |                      | <u>SPA AND PAVILION</u> |
| Other  |                         |                      | <u>IN FRONT YARD</u>    |

# A-22-30 Zoning



11/2/2022, 10:35:12 AM

1:4,514

0 0.03 0.06 0.12 mi

0 0.05 0.1 0.2 km

Hunter Simmons, JeffCoAL, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA, USDA

ArcGIS Web AppBuilder

JeffCoAL, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA, USDA | Jefferson County Information Technology Services | Hunter Simmons | Jefferson County Department of Information Technology |

- CADStreetCenterlines
- InterimTaxParcels
- JeffCoMunicipalBoundary
- JeffcoMunicipalBoundary\_Negative
- Building Footprints 2020v1
- Lot Lines
- Tax\_Parcels 2021
- Estate Residence District
- Residence A District

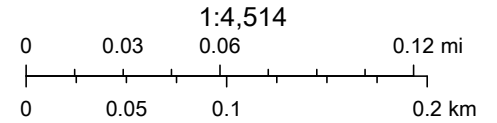


# A-22-30 Aerial



11/2/2022, 10:37:24 AM

- CADStreetCenterlines
- InterimTaxParcels
- JeffCoMunicipalBoundary
- JeffcoMunicipalBoundary\_Negative
- Aerial 2021
- Red: Band\_1
- Green: Band\_2
- Blue: Band\_3



Jefferson County Department of Information Technology, Hunter Simmons, JeffCoAL, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA, USDA

ArcGIS Web AppBuilder



## Report to the Board of Zoning Adjustment

A-22-19

### ***Petition Summary***

Request to allow a detached accessory structure in the secondary front yard (Overton Road) in lieu of the requirement that accessory structures be located only in a side yard or rear yard.

### ***Scope of Work***

The scope of work entails a proposed a new pavilion in the secondary front yard.

### ***Variance Request for Secondary Front (Overton Road) Yard***

**Nexus:** The hardship in this case is the double frontage lot configuration which is reasonably related to the request.

**Possible Findings for Approval:** The double frontage lot has the primary front on Woodridge Road, with Overton Road being the rear of the home. The site has an existing pool and spa to the rear of the home (within in the secondary front yard area along Overton Road) in the same location as the proposed pavilion. The topography is such that the area in question sits approximately 60 feet above the Overton Road which would shield the view of the proposed pavilion from the secondary front entirely.

### ***It is anticipated that an approval of such variance:***

- a. is minor in nature (in that the proposed structure is small).
- b. Is in keeping with the spirit and intent of the zoning ordinance (in that the proposed structure will not be visible from the secondary road frontage).

### ***Impervious Area***

The proposal is in compliance with the allowable impervious surface area.

### ***Subject Property and Surrounding Land Uses***

The property contains a single-family dwelling, and is surrounded by same.

### ***Affected Regulation***

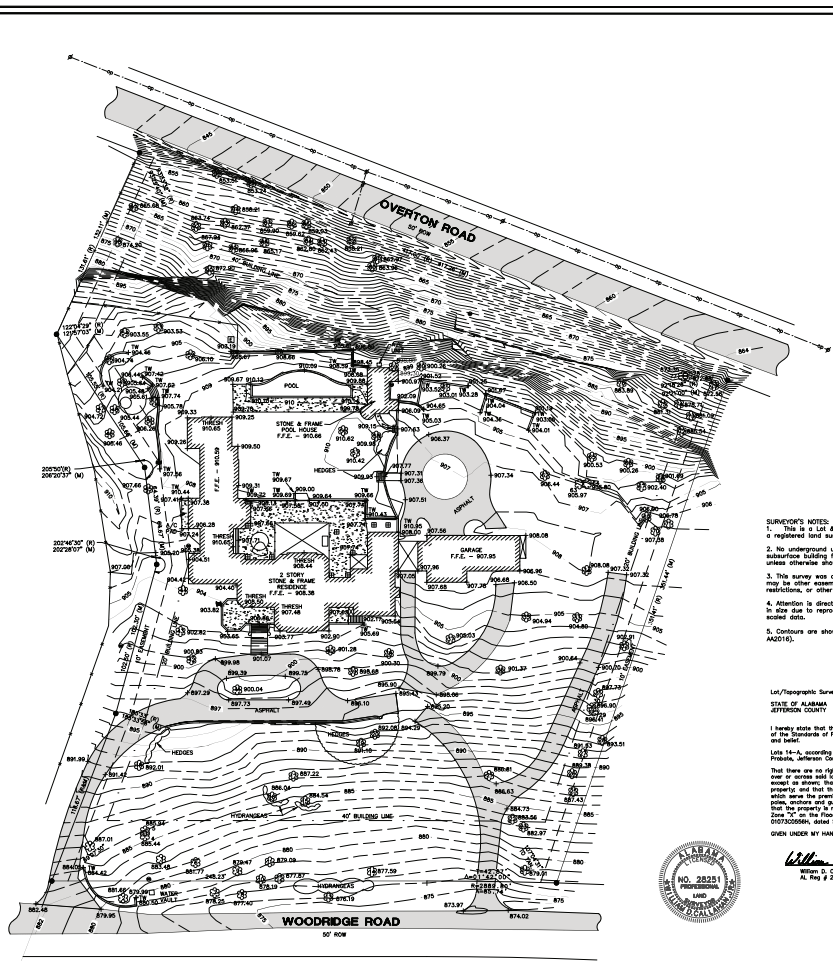
Article XIX, General Area and Dimensional Requirements; Section 129-318, Private Recreational Facilities in Residential Districts.

### ***Appends***

LOCATION: 2704 Woodridge Road

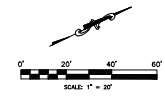
ZONING DISTRICT: Residence A District

OWNERS: William and Judy Nelson



**LEGEND**

|   |                                     |    |                          |
|---|-------------------------------------|----|--------------------------|
| ● | IRON FOUND DESCRIPTION              | □  | CONCRETE                 |
| ○ | 1/2" IRON PIPE SET WITH CAP STAMPEL | ▨  | STONE FRAMES             |
| ○ | UTILITY POLE                        | ▨  | RECORDED                 |
| — | IRONING UTILITY LINES               | ▨  | SPRINKLER                |
| — | FENCE                               | AC | ACRES                    |
| — | WATER LINE                          | ○  | 6" GAS METER             |
| — | WATER METER                         | ○  | WASTEWATER SEWER MANHOLE |
| — | FIRE HOSEWAY                        | ○  | WASTEWATER SEWER MANHOLE |
| — | TOP OF HILL ELEVATION               | FC | FENCE CORNER             |
| — | POWER ADA                           |    |                          |



**SURVEYOR'S NOTES:**

- This is a **LET & TOPOGRAPHIC SURVEY**, made on the ground under the supervision of a registered land surveyor. Field survey was completed on December 4, 2015.
- No underground utilities, underground encroachments, underground pipes, or subterranean building foundations were measured or located as a part of this survey, unless otherwise shown. Trees and shrubs not located, unless otherwise shown.
- This survey was conducted without the benefit of an abstract of title, therefore, there may be other encumbrances, rights-of-way, easements, liens, mortgages, reservations, restrictions, or other similar matters of public record, not depicted on this survey.
- Attention is directed to the fact that this survey may have been reduced or enlarged in size due to reproduction. This should be taken into consideration when calculating scaled data.
- Contours are shown on one (1) foot intervals and are based on U.S.G.S. datum (F.D. AAD101).

Let/Topographic Survey  
 STATE OF ALABAMA  
 STEPHEN COUNTY

I hereby certify that this survey and drawing have been completed in accordance with the current requirements of the Board of Licensure for the State of Alabama to the best of my knowledge, information and belief.

Letts 14-A, according to the CONWAY RESUBDIVISION, as the same appears of record in the Office of the Judge of Probate, Jefferson County, Alabama, in Map Book 181, Page 68.

That there are no rights-of-way, easements, liens, mortgages or encumbrances, known or unknown, shown on this survey or shown on any recorded plat except as shown; that this survey shows the improvements located on said property and that there are no other improvements shown, including any which were the premises only or structures or appurtenant interests, including poles, wires, pipes, or any other appurtenances, shown or shown, and that the property is not located in a special flood hazard area as shown on Zone "X" on the Flood Insurance Rate Map for the area (Map No. 15-11013), dated September 3, 2010.

WEN UNDER MY HAND AND SEAL, this 4th day of December, 2015.



*William D. Collier, Jr.*  
 William D. Collier, Jr., PLS  
 AL Reg # 28351

**TREE INFORMATION**

|    |          |
|----|----------|
| 1  | 14" PINE |
| 2  | 14" PINE |
| 3  | 14" PINE |
| 4  | 14" PINE |
| 5  | 14" PINE |
| 6  | 14" PINE |
| 7  | 14" PINE |
| 8  | 14" PINE |
| 9  | 14" PINE |
| 10 | 14" PINE |
| 11 | 14" PINE |
| 12 | 14" PINE |
| 13 | 14" PINE |
| 14 | 14" PINE |
| 15 | 14" PINE |
| 16 | 14" PINE |
| 17 | 14" PINE |
| 18 | 14" PINE |
| 19 | 14" PINE |
| 20 | 14" PINE |
| 21 | 14" PINE |
| 22 | 14" PINE |
| 23 | 14" PINE |
| 24 | 14" PINE |
| 25 | 14" PINE |
| 26 | 14" PINE |
| 27 | 14" PINE |
| 28 | 14" PINE |
| 29 | 14" PINE |
| 30 | 14" PINE |
| 31 | 14" PINE |
| 32 | 14" PINE |
| 33 | 14" PINE |
| 34 | 14" PINE |
| 35 | 14" PINE |
| 36 | 14" PINE |
| 37 | 14" PINE |
| 38 | 14" PINE |
| 39 | 14" PINE |
| 40 | 14" PINE |
| 41 | 14" PINE |
| 42 | 14" PINE |
| 43 | 14" PINE |
| 44 | 14" PINE |
| 45 | 14" PINE |
| 46 | 14" PINE |
| 47 | 14" PINE |
| 48 | 14" PINE |
| 49 | 14" PINE |
| 50 | 14" PINE |
| 51 | 14" PINE |
| 52 | 14" PINE |
| 53 | 14" PINE |
| 54 | 14" PINE |
| 55 | 14" PINE |
| 56 | 14" PINE |
| 57 | 14" PINE |
| 58 | 14" PINE |
| 59 | 14" PINE |
| 60 | 14" PINE |
| 61 | 14" PINE |
| 62 | 14" PINE |
| 63 | 14" PINE |
| 64 | 14" PINE |
| 65 | 14" PINE |
| 66 | 14" PINE |
| 67 | 14" PINE |
| 68 | 14" PINE |
| 69 | 14" PINE |
| 70 | 14" PINE |
| 71 | 14" PINE |
| 72 | 14" PINE |
| 73 | 14" PINE |
| 74 | 14" PINE |
| 75 | 14" PINE |
| 76 | 14" PINE |
| 77 | 14" PINE |
| 78 | 14" PINE |
| 79 | 14" PINE |
| 80 | 14" PINE |
| 81 | 14" PINE |
| 82 | 14" PINE |
| 83 | 14" PINE |
| 84 | 14" PINE |
| 85 | 14" PINE |
| 86 | 14" PINE |
| 87 | 14" PINE |
| 88 | 14" PINE |
| 89 | 14" PINE |
| 90 | 14" PINE |

**South Central Surveying, LLC**  
 10000 W. ALABAMA AVE., SUITE 100  
 ALABAMA CITY, AL 35001  
 PHONE: 205-771-4444  
 FAX: 205-771-4444  
 EMAIL: southcentral@scsurveying.com

1 of 1

PROJECT NO: 15-11013

PROPERTY ADDRESS: 2704 WOODRIDGE ROAD, MT. BROOK, AL 35223



**A-22-30**

**LAURA BARTLETT**  
ARCHITECT

2935 CARLISLE ROAD  
BIRMINGHAM, ALABAMA 35213  
404.512.9530  
laura@laurabartlettarchitect.com

NOTES

PROJECT INFORMATION

*a new pavilion for  
Judy and Bill Nelson*  
2704 Woodridge Road  
Mountain Brook, Alabama  
35223

ISSUE DATE

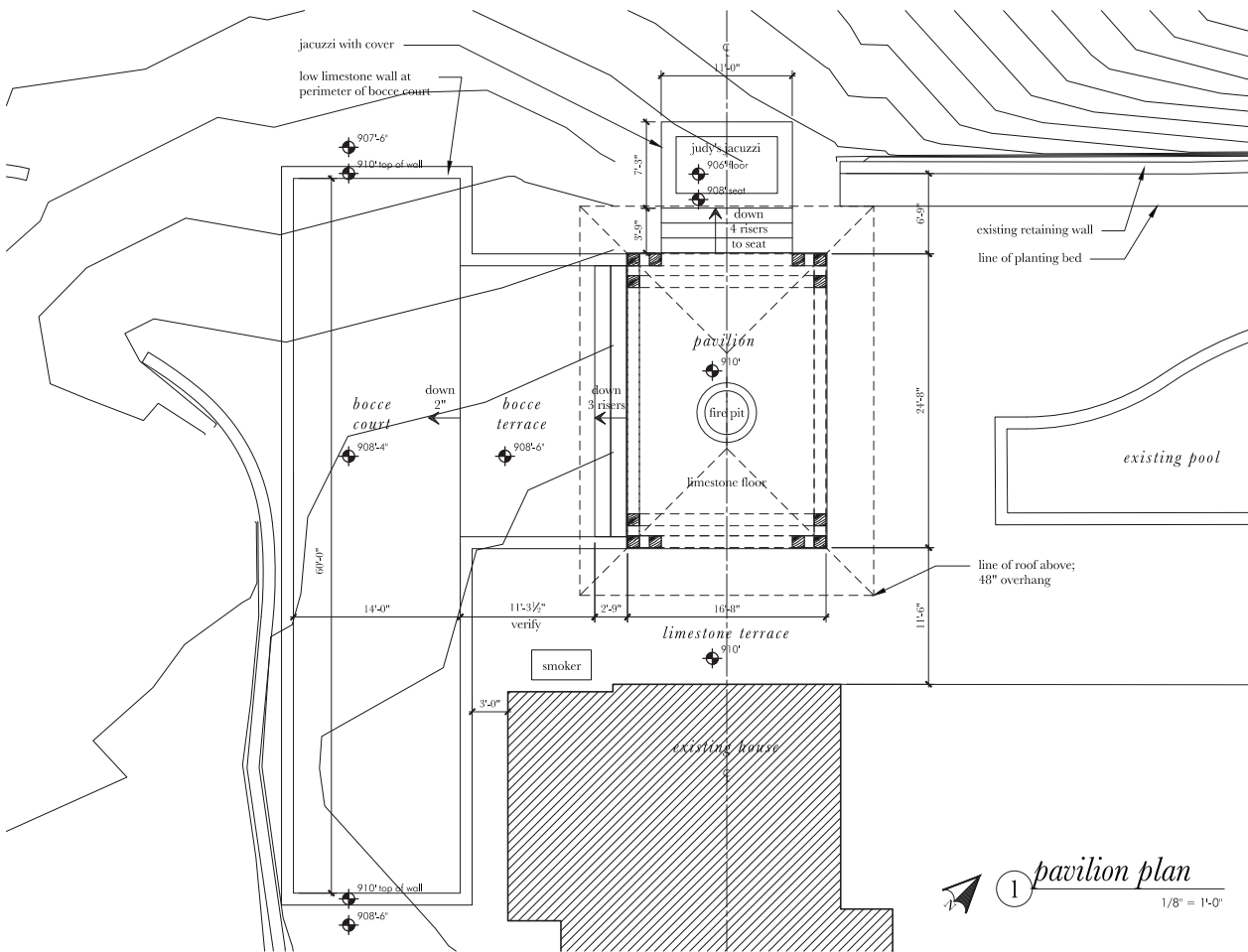
August 10, 2022

SHEET

*Pavilion Plan*

**A2.0**

Plotted: 8/10/2022 11:18 AM



**A-22-30**

**LAURA BARTLETT**  
ARCHITECT

2935 CARLISLE ROAD  
BIRMINGHAM, ALABAMA 35213  
404.512.9530  
[laura@laurabartlettarchitect.com](mailto:laura@laurabartlettarchitect.com)

NOTES

PROJECT INFORMATION

*a new pavilion for  
Judy and Bill Nelson*  
2704 Woodridge Road  
Mountain Brook, Alabama  
35223

ISSUE DATE

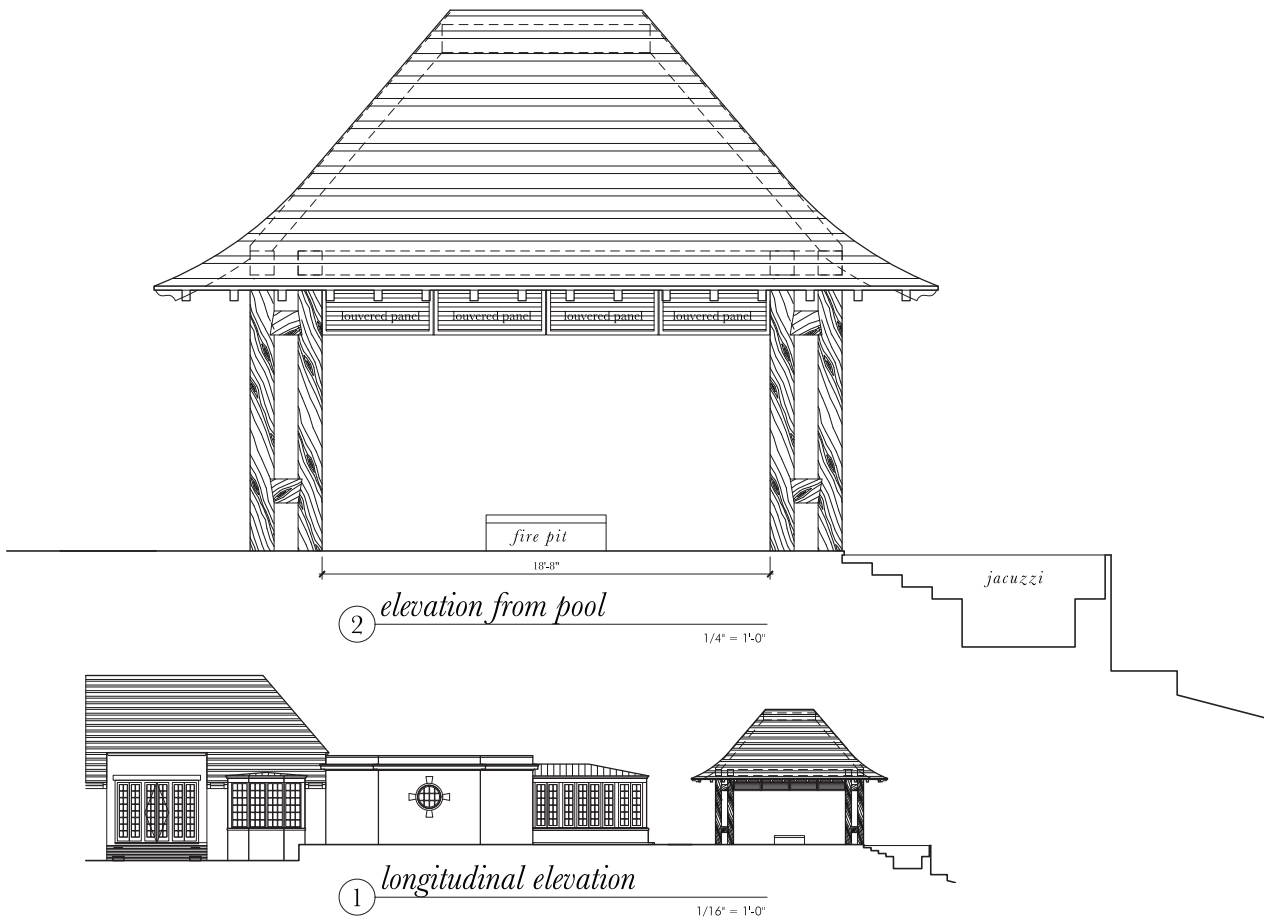
*August 10, 2022*

SHEET

*Pavilion Elevations*

**A3.0**

Plotted: 8/10/2022 11:19 AM



A-22-30

LAURA BARTLETT  
ARCHITECT

2935 CARLISLE ROAD  
BIRMINGHAM, ALABAMA 35213  
404.512.9530  
laura@laurabartlettarchitect.com

NOTES

PROJECT INFORMATION

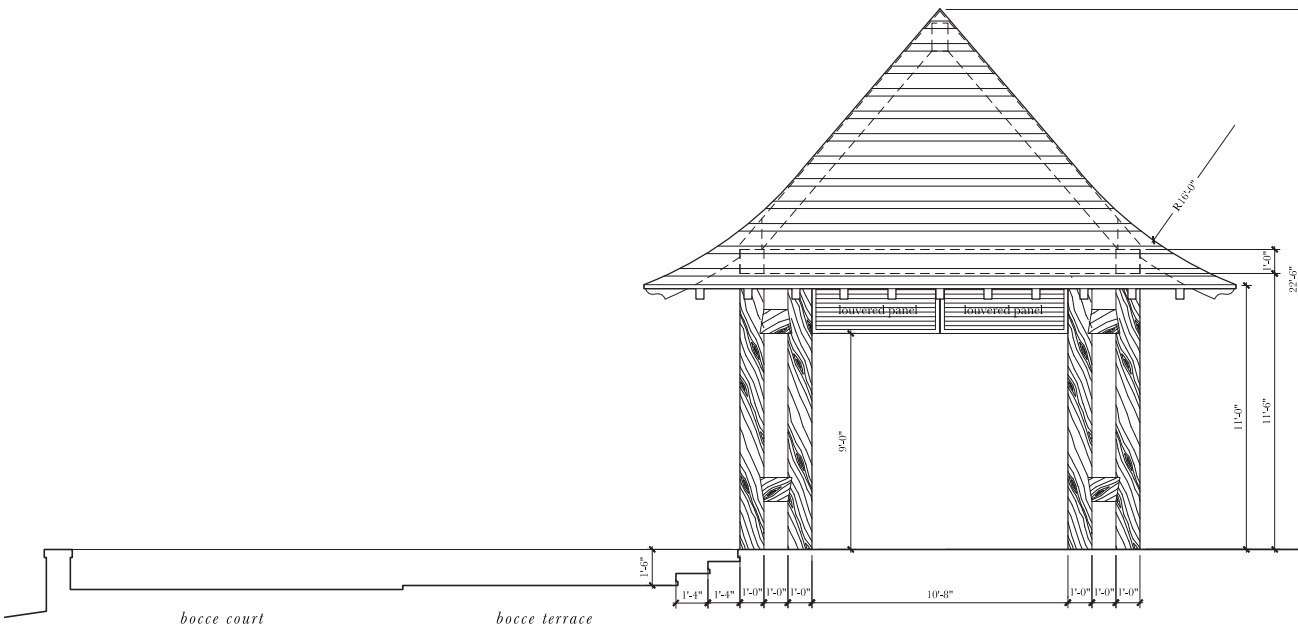
*a new pavilion for  
Judy and Bill Nelson*  
2704 Woodridge Road  
Mountain Brook, Alabama  
35223

ISSUE DATE

August 10, 2022

SHEET

Pavilion Elevation



① *elevation from exercise room*

1/4" = 1'-0"

A3.1

Plotted: 8/10/2022 11:22 AM



## Variance Application Part II

### Required Findings (Sec. 129-455 of the Zoning Ordinance)

To aid staff in determining that the required hardship findings can be made in this particular case, please answer the following questions with regard to your request. **These findings must be made by the Board of Zoning Adjustment in order for a variance to be granted** (please attach a separate sheet if necessary).

What special circumstances or conditions, applying to the building or land in question, are peculiar to such building or land, and do not apply generally to other buildings or land in the vicinity (including size, shape, topography, location or surroundings)?

THE OWNERS WOULD LIKE TO ADD A SPA, PAVILION AND BOWLING COURT ADJACENT TO THEIR EXISTING POOL AND PATIO. THEIR LOT TOUCHES TWO ROADS MAKING THEIR "BACKYARD" ALSO A FRONT YARD. HOWEVER, FOR THIS FRONTAGE, THEY ARE 60' ABOVE OVERTON ROAD WITH AN EXISTING CLIFF AND VEGETATIVE SCREEN. FROM THE ROAD, IT IS VERY DIFFICULT TO SEE THE PROPOSED IMPROVEMENTS.

Was the condition from which relief is sought a result of action by the applicant? (i.e., self-imposed hardship such as: "...converted existing garage to living space and am now seeking a variance to construct a new garage in a required setback...")

NO. THE EXISTING GRADE OF THE PROPOSED ELEMENTS ARE STILL SCREENED FROM THE ROAD BY THE TOPOGRAPHY AND VEGETATION.

How would the granting of this variance be consistent with the purpose and intent of the Zoning Regulations?

THE TOPOGRAPHY CREATES A CONDITION THAT THE SECONDARY FRONT DOES NOT FEEL LIKE A FRONT YARD BUT THE ORDINANCE IS WRITTEN IN SUCH A WAY THAT THIS CREATES A SITUATION WHERE A VARIANCE IS BEING ASKED FOR.